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AMPHIBIANS AND REPTILES FROM IRAN

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INTRODUCTION

In 1958 the author was in Iran from late February through November. During this period a collection of amphibians and reptiles was assembled, largely from the areas of operation of the Iranian Oil Exploration and Producing Company. The principal collecting localities are indicated in figure 2. The numbers do not indicate the chronological sequence of the collection, as many of these localities were revisited several times during the year.

This paper constitutes a report on the collection made by the author, and on the geographic and ecological observations recorded. The herpetofauna of Iran, particularly that of Khuzistan Province, is incompletely known, and accurate distributional records are few. Probably the great majority of amphibians and lizards present in the foothill region of Khuzistan are represented in the present collection. The snakes are less well represented. Wall (1908) has reported on a collection of snakes from the same area.

GEOGRAPHY AND ECOLOGY

The foothills of the Zagros, between the high mountains and the coastal plain at the head of the Persian Gulf, provide the principal source of the present collection (figs. 3 and 4). From the coastal plain a series of ridges

and valleys carved in the parallel series of anticlines and synclines provides a variety of habitat situations from 500 to 5,000 feet in elevation. This foothill belt is characterized by open and incompetent folding of strata, the strike being fairly consistent in a northwest-southeast direction. This gives rise to a series of parallel but broken ridges continuing into the higher elevations of the Zagros Mountains. The formations are limestones, marls, and gypsum.

The drainage of the central foothills of the Zagros is an intricate pattern of narrow, steep-sided gorges. Through these gorges the rivers run through the ridges toward the Mesopotamian lowlands. The principal drainage of this region is the Karun River which follows a tortuous course through the foothills onto the Ahwaz Plain, eventually joining the Shatt 'al Arab (formed by the confluence of the Tigris and the Euphrates rivers). In many areas there are no passages through the ridges, and the permanent streams, fed by many seasonal drainages, flow along the strike and cross from one syncline to another where gaps in the ridges occur. In the uplands much of the water flows underground through passages in the gypsum. These narrow tunnels and sinkholes contain water throughout the summer when the majority of the surface drainages are dry.

The environment of this foothill region has been severely altered by the transhumance of the local population. Probably within historical time the vegetation of this area was mixed woodland. The practice of uncontrolled deforestation for the manufacture of charcoal has completely denuded all but the least accessible slopes of the Zagros Mountains. This, coupled with overgrazing and centuries of constant cultivation, has resulted in severe erosion throughout southwest Iran.

The most striking aspect of the flora is the absence of woody vegetation other than occasional thorny shrubs and widely scattered small trees. This, in combination with the climatic factors, causes a striking contrast between the spring vegetation and that of the remainder of the year. From March until early June the hillsides are green, with numerous wildflowers on the slopes and along the many seasonal stream courses. All arable land is under cultivation at this season, the principal crops being wheat and barley. The length of the growing season is highly dependent on the winter and early spring rainfall, an extra week of daily rains greatly increasing the length of the spring season.

The length of the growing season has a profound effect on the fauna of the area, inasmuch as the availability of the principal prey species, small rodents and orthopterous insects, is strictly dependent on the amount of available vegetation. In the late spring and early summer there are great numbers of grasshoppers, and these decrease throughout the summer, some still remaining in the fall. Doubtless these form the bulk of the food supply for a great many species.

The long summer presents an extremely barren landscape, all the annual

herbaceous plants having disappeared. A few small thorny legumes and other sparse shrubs make up the entire summer flora. All but the major water courses are dry by mid-summer. There is a brief resurgence of growth in the late fall after the first rains in November, which is accompanied by an increase in the number of insects.

The early rains begin in November, and March generally marks the end of the rainy season. The spring temperatures are mild, neither the daily highs nor the daily lows being extreme. The summer temperatures become increasingly high, both the daily highs and the daily lows, there being very little cooling at night. The ground temperatures exceed 50°C. before midday and remain high until late in the afternoon, the barren ground readily absorbing the intense heat of the day and reradiating it at night, thus maintaining high air temperatures long after the sun has set. Temperatures remain high until October, at which time there is a considerable drop in the daily temperatures, particularly night temperatures. Figure 1 shows seasonal changes in mean daily high and low air temperatures as Masjid-i-Suleiman from February through November, 1958.

Localities 1–21 lie in the foothill belt.

The *Ahwaz Plain is* geographically an extension of the Mesopotamian lowlands. The plain rises in the north and east, and is deeply dissected

FIGURE 1. Mean daily temperatures and humidity for Masjid-i-Suleiman, Iran, in 1958. Based on data from the Masjid-i-Suleiman weather station.

in many areas. There are scattered areas of active dunes, as in the Dasht-i-Mishan.

Except for cultivation along the rivers, vegetation is very sparse, consisting of occasional low shrubs.

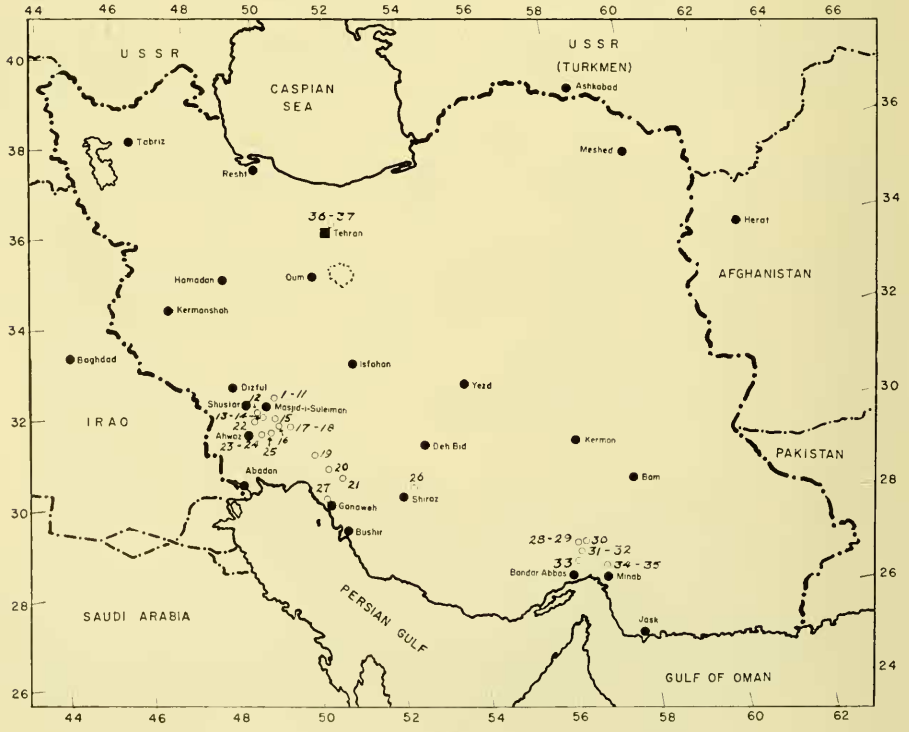
Both daily highs and lows are extremely high in summer, and the humidity is relatively high, particularly near the Persian Gulf and near the rivers, as compared with the drier foothill belt.

The total rainfall is less on the plain than in the foothills, but much of the precipitation may come in a few heavy rains. Adams (1962) indicates that the annual rainfall on the upper plain of Khuzistan is 200–300 millimeters. The drainages are often suddenly swollen, causing erosion and deeper dissection of the higher parts of the plain, and flooding of the land along the Karun River.

Localities 22–25 are on the Ahwaz Plain.

The Persian Gulf coast is characterized in most areas by a narrow coastal plain, the foothills often being quite close to the gulf. There is frequently a belt of coastal dues.

The flora is primarily a desert vegetation. In some places there are flat savannahs where there are numerous trees. There are many xerophytic



shrubs growing on the coastal plains and in the low coastal foothills (fig. 6). The primary agriculture is that of the date palm.

In the south, large anticlinal structures rise abruptly out of the coastal plain. Inland from the gulf the plain is deeply dissected into rugged badlands. In these areas of severe erosion, vegetation is extremely scanty.

Figure 2. Map showing the localities in Iran where amphibians and reptiles were collected.

1. Masjid-i-Suleiman, Khuzistan Province, 31° 57′ N., 49° 16′ E.
2. Naftak, staff housing north of Masjid-i-Suleiman, Khuzistan Province, 31° 58′ N., 49° 15′ E.
3. Masjid-i-Suleiman Airfield and vicinity, 31° 59′ N., 49° 15′ E.
4. Sar-i-Gach, Khuzistan Province, 31° 57′ N., 49° 21′ E.
5. Tul-i-Bazun, abandoned airfield, Khuzistan Province, 31°55′ N., 49° 25′ E.
6. Bard-i-Nishunde, Khuzistan Province, 31° 57′ N., 49° 21′ E.
7. Godar Landar, Khuzistan Province, 32° 01′ N., 49° 23′ E.
8. Zeloi, Khuzistan Province, 32° 13′ N., 49° 04′ E.
9. Lali, Khuzistan Province, 32° 15′ N., 49° 05′ E.
10. Lali Well No. 1, Karun River gorge, Khuzistan Province, 32° 14′ N., 49° 11′ E.
11. Sar-i-Naftak, near Tang-i-Golestan, Khuzistan Province.
12. Culvert on road between Masjid-i-Suleiman and Batwand, Khuzistan Province, 31° 55′ N., 49° 25′ E.
13. Lahabira Valley, Khuzistan Province, 31° 56′ N., 49° 09′ E.
14. Naft Sefid oil field, Khuzistan Province, 31° 40′ N., 49° 14′ E.
15. Yamaha, Khuzistan Province, 31° 47′ N., 49° 23′ E.
16. Haft Kel, Khuzistan Province, 31° 28′ N., 49° 30′ E.
17. Lake, 17 kilometers east of Haft Kel.
18. Champ Kure, Khuzistan Province, 31° 31′ N., 49° 50′ E.
19. Agha Jari, Khuzistan Province, 30° 43′ N., 49° 49′ E.
20. Gach Saran, 30° 20′ N., 50° 48′ E.
21. Chah Sefid, 30° 00′ N., 50° 52′ E.
22. Dar-i-Khazineh, Khuzistan Province, 31° 45′ N., 49° 08′ E.
23. Sand dunes on Ahwaz Ridge, Khuzistan Province, 31° 18′ N., 48° 45′ E.
24. Kurait, east of Ahwaz, Khuzistan Province, 31° 17′ N., 48° 49′ E.
25. Sand dunes on road between Ahwaz and Haft Kel, Khuzistan Province, 31° 16′ N., 49° 11′ E.
26. Persepolis, 29° 56′ N., 52° 49′ E. 5,500′.
27. Binak, at the foot of Kuh-i-Bang, 29° 44′ N., 50° 19′ E.
28. 35 miles north of Bandar Abbas, 27° 30′ N., 56° 18′ E.
29. East of Kuh-i-Ginau, 27° 33′ N., 56° 24′ E.
30. Khurgu, 27° 33′ N., 56° 27′ E.
31. Road just north of Shagu, 27° 17′ N., 56° 22′ E.
32. Dunes at Shagu, 27° 15′ N., 56° 25′ E.
33. Dunes on road from Bandar Abbas to Kerman, northeast of Bandar Abbas, 27° 12′ N., 56° 21′ E.
34. Date grove at Minab, 27° 09′ N., 57° 07′ E.
35. Dunes at Minab, 27° 09′ N., 57° 07′ E.
36. Foothills of Elburz Mountains, north of Tehran.
37. Hills east of Tehran on Ab Ali Road.

Although there are many species of desert shrubs, there is no immediate ground-cover other than spring grasses, which complete their growing season within a very few weeks.

There are a few small active dune areas inland from the coast, similar to other scattered dunes in southern Iran.

Localities 27–35 are in the coastal area.

LOCALITIES

The latitude and longitude of the localities were determined from U. S. Air Force Aeronautical Approach Charts and can only be regarded as approximations.

Masjid-i-Suleiman (localities 1 and 3). Lat. 31° 57′ N., long. 49° 16′ E. Field headquarters of the Iranian Oil Exploration and Producing Company. On many maps it appears as Maidan-i-Naftun. Wall (1908) refers to it as Maidan Mihaftan. The terrain is one of valley and ridge, typical of the foothill belt. Incompetent folding of the gypsum rock of the lower Fars formation has led to an erosion pattern of ridges of resistant rocks and strike-valleys cut in the more readily eroded layers.

Naftak (2). Lat. 31° 58′ N., long. 49° 15′ E. is a residence area about five kilometers to the north of Masjid-i-Suleiman proper, and is slightly higher in elevation. The road from Masjid-i-Suleiman to Naftak winds through low hills composed chiefly of gypsum.

Sar-i-Gach (4). Lat. 31° 57′ N., long. 49° 21′ E. A ridge to the east of Masjid-i-Suleiman composed principally of gypsum. It is crossed by a well-maintained, surfaced road, which serves the wells of the Masjid-i-Suleiman oil field and the water pumping station at Godar Landar.

Tul-i-Bazun (5). Lat. 31° 55′ N., long. 49° 25′ E. Near the top of the Sar-i-Gach ridge, a road runs south from the Sar-i-Gach road to an abandoned airstrip. Along this road are sinkholes in the gypsum which contain water throughout the year.

Bard-i-Nishunde (7). Lat. 31° 58′ N., long. 49° 21′ E. Site of a pre-Achaemenian ruin lying north of the road near the crest of Sar-i-Gach.

Godar Landar (7). Lat. 32° 01′ N., long. 49° 23′ E. A pumping station supplying Masjid-i-Suleiman with water from the Karun River. Across the river from the pumping station rises a steep conglomerate wall, composed of limestone pebbles and cobbles, to the high ridge of Kuh-i-Landar.

Zeloi (8). Lat. 32° 13′ N., long. 49° 04′ E. A plain west of the road between Masjid-i-Suleiman and Lali. There are streams and sinkholes in the gypsum. This was a former site of exploratory oil drilling and traversable roads still exist to some of the well sites.

Lali (9, 10). Lat. 32° 15′ N., long. 49° 05′ E. This is the northernmost oil field in the foothill area of Khuzistan. It is located in the hills through

which flows the Karun River. There are considerable salt deposits in this region.

Sar-i-Naftak and *Tang-i-Golestan* (11). A surfaced road connecting Masjid-i-Suleiman with Batwand winds down the Sar-i-Naftak ridge,

Figure 3. Foothill region, March 1958. Zagros Mountains in the background. Foreground is typical habitat of *Agama nupta*, *Mabuya aurata septemtaeniata*, *Coluber rhodorachis*, and *Psammophis schokari*.

through Tang-i-Golestan, a steep-sided canyon. A small stream passes under this road through a culvert (12). Lat. 31° 55′ N., long. 49° 25′ E. At Batwand this road meets the newer Masjid-i-Suleiman–Ahwaz road.

Naft Safid (14). Lat. 31° 40′ N., long. 49° 14′ E. An oil field on the

FIGURE 4. Stream in the foothill region near Station 12 (fig. 2), April, 1958. Habitat of *Rana ridibunda* and *Hyla arborea savignyi*.

western slope of the foothill belt. The terrain is typical of the foothill region.

Yamaha (15). Lat. 31° 47′ N., long. 49° 23′ E. An abandoned site of exploratory oil drilling near the Tembi River in the foothills south of Masjid-i-Suleiman. A road runs from Yamaha, across the Tembi River, and through the Masjid-i-Suleiman oil field.

Haft Kel (16). Lat. 31° 28′ N., long. 49° 30′ E. An oil field south of Masjid-i-Suleiman. The road from Masjid-i-Suleiman to Haft Kel runs through typical foothill terrain, traversing a part of the Tembi River drainage. At one point the road emerges onto the small Yamaha plain. It crosses the Ab-i-Lashcar and minor intermittent streams. Haft Kel is near the edge of the foothills; the road from Haft Kel to Ahwaz soon drops onto the flat Ahwaz plain.

Near Haft Kel a road runs east into the Zagros Mountains. Seventeen kilometers east of the Masjid-i-Suleiman–Haft Kel road is a small lake (17) in an undrained depression in the hills. Shrinking to a fraction of its winter size, it provides, even in summer, a refuge for frogs, turtles, and ducks. In summer there is no sign of vegetation near the lake, other than a stand of dry brown reeds at its periphery.

The road into the Zagros leads ultimately to the village of Qal 'eh Tun, site of an old Bakhtiari fortress. From there a jeep track leads through stands of scrub oak to Malagha, a small village on a permanent stream, the Rud-i-Zard, at an elevation of 5,000 feet. Champ Kure (18), lat. 31° 31′ N., long. 49° 50′ E., is a government check station on this road.

Agha Jari (19). Lat. 30° 43′ N., long. 49° 49′ E. An oil field in the foothills at the edge of the coastal plain. There is a small active dune area on a ridge in the foothills near the number 3 production unit of the field.

Gach Saran (20). Lat 30° 20′ N., long. 50° 48′ E. The southernmost oil field in the foothill region. The Dugumbadan airfield and the living areas are on a small plain at the foot of a high ridge. The oil field is located in the foothills.

Chah Safid (21). Lat. 30° N., long. 50° 52′ E. A camp site on the road from Gach Saran to Ganaweh. It is approximately one mile from the junction of the Mishun road. The road traverses terrain of deeply incised gorges, most of which carry an intermittent flow of water. All of the gorges are subject to flood torrents following heavy rains.

Lahabira Valley (13). Lat. 31° 56′ N., long. 49° 09′ E. A valley in the foothills west of Masjid-i-Suleiman. Two to four miles wide, a thin alluvium covers the gypsum in much of the valley floor, through which flows Ab-i-Lashcar, a permanent stream. This stream is fed by seasonal drainages, and here and there are sinkholes in the gypsum.

Shustar. An old city on the Karun River in the relatively high eastern area of the Ahwaz Plain, and not far from the foothills. The road to Shustar passes through areas of low hillocks, ridges, and sandstone outcrops. Much

of the vegetation along this road is that characteristic of the foothill region. Annual rainfall is about 300 millimeters (Adams, 1962).

Ahwaz. The capital of Khuzistan Province, and the commercial and distributional center. Ahwaz lies on the Karun River in the heart of the plain. Both the Iranian National Railway, running from Bandar Shapur and from Khorramshar to Tehran, and the road from Khorramshar to Tehran, pass through Ahwaz. The Karun River is navigable from the Shatt 'al Arab as far as Ahwaz.

Small dune areas (23). Lat. 31° 18′ N., long. 48° 45′ E. are located along the Ahwaz Ridge on the road between Ahwaz and the Ahwaz number 6 well location at *Kurait* (24), lat. 31° 17′ N., long. 48° 49′ E.

Dar-i-Khazineh (22). Lat. 31° 45′ N., long. 49° 08′ E. A small village on the plain near the road from Masjid-i-Suleiman to Ahwaz.

Khalafabad. A ferry crosses the Jarrahi River near the village of Khalafabad on the summer road from Agha Jari to the Ahwaz–Haft Kel road. The road crosses a broad flat plain, where, except for small cultivated areas near villages, the vegetation is sparse and xerophytic.

Sand dunes on the Ahwaz–Haft Kel road (25). Lat. 31° 16′ N., long. 49° 11′ E. The largest dune area visited was on the road between Ahwaz and Haft Kel. These dunes are composed of loose sand, transported and altered by the wind. A few shrubs grow on the dunes and on the sandy fringes. Some grasses and thorny shrubs are found in the "blow-out" depressions among the dunes, and the root systems have some stabilizing effect.

Persepolis (26). Lat. 29° 56′ N., long. 52° 49′ E. Ruins of the palace of the Achaemenian kings. It is on a terrace above a plain, in a large valley in the Zagros Mountains. The elevation is approximately 5,500 feet. It lies at the foot of high limestone hills. The hills are barren except for a few small shrubs. There is considerable agriculture on the plain.

Binak (27). Lat. 29° 44′ N., long. 50° 19′ E. Site of an exploratory well at the foot of Kuh-i-Bang on the Persian Gulf. There is a narrow strip of coastal dunes, on which grow a few shrubs. Kuh-i-Bang is an anticlinal structure, approximately one mile in length, rising out of the coastal plain. The vegetation of the plain is sparse. There is some date culture at Ganaweh on the coast to the southeast. A few low hills lie at the foot of Kuh-i-Bang and along the coast.

Bandar Abbas (28–33). An ancient seaport at the Strait of Hormuz. A road runs from Bandar Abbas to Kerman and Shiraz. East of the town, along the road to Kerman, there is a small active dune area (33), lat. 27° 12′ N., long. 56° 21′ E., much like the dune areas on the Ahwaz Plain.

Three prominent anticlinal structures rise out of the plain north of Bandar Abbas. These are Kuh-i-Ganau, Khurgu, and Kush Kuh. Between Bandar Abbas and Kuh-i-Ganau, the road passes through areas of savannah, sandstone outcrops, and low hills, emerging onto a higher, cobbled plain.

Here there is true desert vegetation (fig. 5). Many of the thorny, xerophytic shrubs of the plain extend onto the slopes of the mountains.

Although as a whole the area is quite arid, there are a few drainages where streams persist the year round. There is considerable date culture along these streams, even into the mountains to 3,000 feet.

Shagu (31), lat. 27° 17′ N., long. 56° 22′ E., is a small village, primarily a truck stop, a few miles north of Bandar Abbas on the road to Kerman. Just east of the village, on the road to Minab, there is a small active dune area (32), lat. 27° 15′ N., long. 56° 25′ E.

Minab (34, 35). Lat. 27° 09′ N., long. 57° 07′ E. The road from Shagu to Minab crosses a flat plain, many of the savannahs having numerous trees. Minab is a date-growing center. The Rud-i-Minab is the principal drainage. Minab is located at the edge of the coastal plain, there being much folded strata to the east, continuing into Baluchistan.

A small active dune area (35) lies north of the town, against a low ridge. The vegetation of the Minab area, other than the extensive date cultivation, consists of a few desert shrubs.

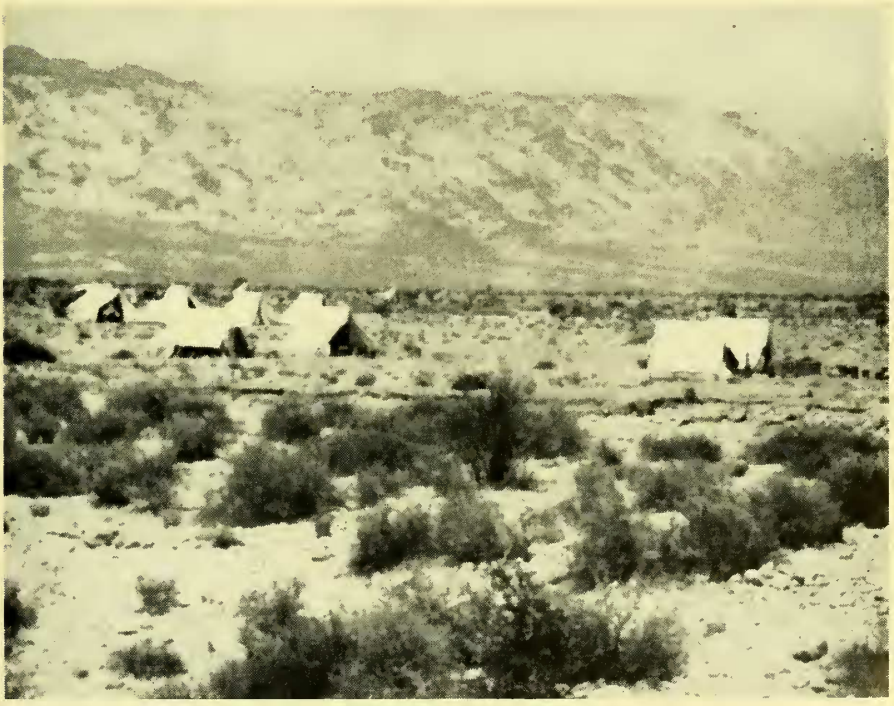


FIGURE 5. Terrain near Kuh-i-Ginau, southern Iran (Station 28 in fig. 2), April, 1958. Habitat of *Eremias guttulata watsonana*.

SYSTEMATIC AND ECOLOGICAL DISCUSSION

Class AMPHIBIA

Order Salientia

Family Bufonidae

Genus **Bufo** Laurenti

Bufo viridis Laurenti.

Bufo viridis Laurenti, 1768, Synops. Rept., p. 27, pl. 1, fig. 1.

Known range. Europe east of the Rhine and Rhone rivers; North Africa; southwest and central Asia, from the Mediterranean to Tibet and Mongolia; from below sea level near the Dead Sea to 15,000 feet in the Himalayas.

Material examined (14). Station 1[1] (CAS 86262[2] [II/27/58; ♂]; 86263 [III/2/58, ♀]; 86285 [III/19/58, ♂]; 86330 [IV/13/58, ♂]; 86641–86642 [♀ ♀]; 86643–86645 [♂ ♂] [XI/30/58]). Stream 15 km. north of Station 1 (CAS 86284 [III/10/58, ♂]). Station 2 (CAS 86324 [III/30/58, ♂]). Stream near Station 3 (CAS 86594 [IX/11/58, ♀]). Station 10 (CAS 86289 [III/20/58, ♂]). Stream near Station 17 (CAS 86327 [III/28/58, ♂]).

Remarks. The interorbital space is as wide as, or wider than, the upper eyelid in this series. There are numerous warts on the dorsum. The larger warts are surmounted by a prominent tubercle tipped with a black asperity, and this tubercle is surrounded by smaller, similar tubercles. The tubercles of nonbreeding females are reduced, and lack the asperity.

The toads are numerous in Khuzistan Province along stream courses in early spring, usually in the grass, rarely actually in the water. They were found occasionally under rocks on dry hillsides several hundred yards from water. Active in cultivated gardens throughout the summer, they were often seen at night in the grass near an outdoor light, feeding on insects attracted to the light. After rains in the late fall they were numerous on paved roads in the evening.

Bufo viridis was seen, but not collected at Persepolis in August.

On two occasions males were heard to make a bird-like warbling call along a stream in early March, several individuals participating in the chorus at dusk.

Strings of eggs were found in the streams in late February and early March. By early April most of the larvae had metamorphosed, the water along seasonal drainages by this time limited to intermittent pools diminish-

1. Station numbers refer to localities described on p. 6 of ms., and fig. 2.

2. California Academy of Sciences catalog number.

ing in size. Two females and three males collected November 30, at Masjid-i-Suleiman appear to be in breeding condition.

Stomachs of toads collected in November contained ants and termites; CAS 86643 contained a centipede. The stomach of CAS 86285, collected March 19, contained terrestrial isopods, lepidopterous larvae, and other arthropods. There was also a calcareous mass, 6 mm. in diameter, in the stomach. Grass was present in the stomach of CAS 86289; this stomach contained no animal remains.

Bufo olivaceus Blanford.

(Figure 7.)

Bufo olivaceus Blanford, 1874, Ann. Mag. Nat. Hist., ser. 4, vol. 14, p. 35. (Type locality: Dasht River, Baluchistan [West Pakistan].)

Known range. Southeast Iran and western Pakistan; to 3,000′.

Material examined (33). Station 34 (CAS 86567–86568, 86570–86571, 86576, 86578, 86581–86582, 86584–86585, 86611–86613, 86615–86616, 86618 [♂♂]; 86560, 86569, 86572–86573, 86575, 86577, 86579–86580, 86583, 86595–86599, 86610, 86614, 86617 [♀♀] [X/21/58]).

Remarks. These specimens do not show as pronounced an occipital fold as shown in Blanford's illustration (1876, pl. 28, fig. 3). While Boulenger (1882) states that *B. olivaceus* lacks a tarsal fold, the present specimens possess a well-defined tarsal ridge of closely aligned tubercles.

The Minab series may be characterized as follows: Head and body depressed; snout projects slightly beyond mouth; crown lacks bony ridges; distance between eye and nostril on canthus rostralis equal to at least ⅔ the diameter of the eye; interorbital space equal to at least ¾ the length of the upper eyelid; distance between nostrils equal to ½, or only slightly greater than ½, the interorbital distance; tympanum distinct, the vertical diameter may be slightly greater than the horizontal diameter, the latter being ½ the diameter of the eye. Tongue in preserved specimens longer than wide.

First finger longer than second; toes more than ½ webbed, with the exception of the fourth, which is ⅓ webbed; toes with single subarticular tubercles; a well-defined tarsal ridge of closely aligned tubercles; inner metatarsal tubercle larger than outer metatarsal tubercle; palmar metacarpal tubercle considerably larger than thenar metacarpal tubercle.

Tibio-tarsal articulation reaches angle of mouth or slightly beyond.

A few small warts tipped with black asperities in the dorsal sacral and pelvic areas, slightly more numerous and more pronounced in females, and entirely lacking in CAS 86568 and 86613 (both males).

Paratoids often twice as long or longer than broad, frequently extending to sacral region.

Male with subgular vocal sac.

Pale olive above, white below; immaculate.

Male 56.5 mm. snout-vent length; female 58.0 mm.

These toads are distinct from Boulenger's (1891) description of *B. surdus* which lacks the tympanum (and the annulus tympanicus, columella, and eustachian tube as well, according to Parker, cited by Schmidt, 1955) and which has bony ridges on the crown. Chernov compared one of the animals of the Minab series with Nikolsky's specimens of *B. persicus* (Carevsky, 1926, equated *B. surdus* with *B. persicus,* a view with which Schmidt, 1955, takes issue); he stated (personal communication) that the Minab toad is distinct from his specimens. It is clearly distinct from *B. luristanicus* Schmidt, which has much smaller paratoids, a tuberculate dorsal skin, shorter hind limbs, and the interorbital space narrower than the upper eyelid.

Blanford's specimens came from the Dasht River, which flows into the Gulf of Oman some 15 km. east of the Iran–Pakistan border, Bahu Kalat, just west of the border, and Ghistigan, Bampusht, also on the Iranian side of the border. Blanford (1876) states that at elevations greater than 3,000 feet *B. olivaceus* is replaced by *B. viridis.*

The present series was collected on a single October evening between 6 and 9 P.M. There were hundreds of these toads in and along irrigation ditches near a road running through a date grove (fig. 6). They were collected in the grass, in the mud, on the banks, and in the water of the shallow ditches, all within a distance of 100 yards. The majority were seen sitting or swimming in the water. Those on the banks and in the grass usually sought the water in their efforts to escape capture. These toads greatly outnumbered the representatives of *Rana cyanophlyctis* which were present in the same ditches. None were in breeding condition.

Most of the stomachs examined contained ants primarily, and often beetle larvae and termites. Several individuals had flatworms in the urinary bladder.

Family HYLIDAE

Genus **Hyla** Laurenti

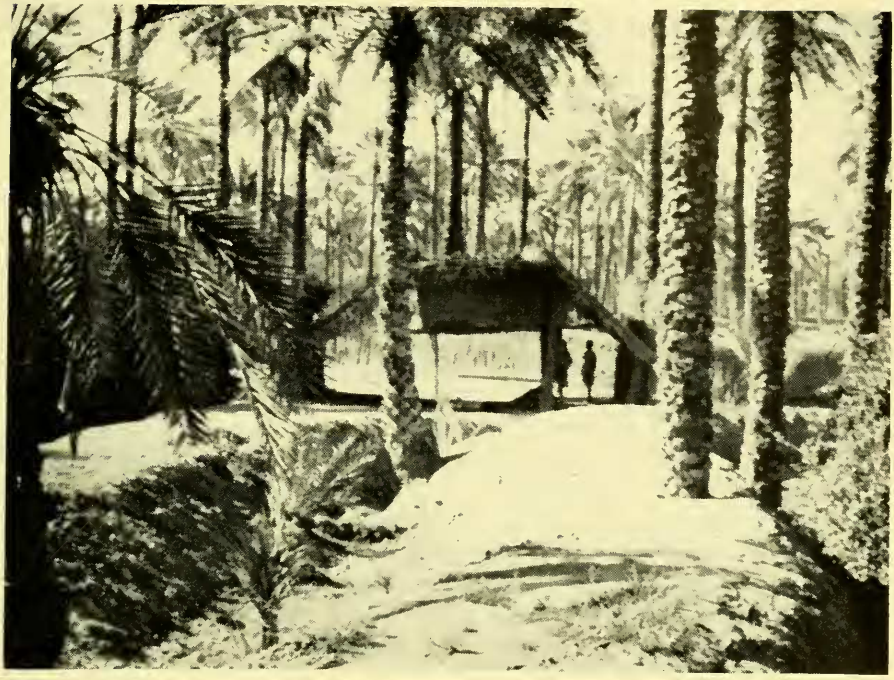
Hyla arborea savignyi Audouin.

Hyla savignyi Audouin, 1827, Descr. Egypte, Rept., Suppl., p. 183, pl. 2, fig. 13. (Type locality: presumed to be Syria.)

Hyla arborea savignyi, Mertens, 1924, Abh. Ber. Mus. Magdeburg, Bd. 3, p. 356.

Figure 6. Date grove at Minab (Station 34 in fig. 2), October, 1958. *Bufo olivaceus* and *Rana cyanophlyctis* were collected in irrigation ditches of this grove.

Figure 7. *Bufo olivaceus.*



Known range. *Hyla arborea* ranges from Europe through North Africa and temperate Asia. The subspecies *H. a. savignyi* is the form of southwest Asia, meeting the typical form in Asia Minor and extending eastward through Iran, being found in the drainages of the Zagros and Elburz Mountains.

Material examined (21). Station 1 (CAS 86286 [III/20/58, ♀]). Stream on road to Station 9, 15 km. north of Station 1 (CAS 86295–86296 [♀ ♀]; 86297–86300 [♂ ♂] [III/10/58]). Stream on road to Station 9, 16.9 km. north of Station 1 (CAS 86312 [III/21/58, ♀]). Vicinity of Station 1 (CAS 86355 [♀]; 86356 [♂] [April, 1958]). Stream between Station 1 and Station 16 (CAS 86446 [VI/14/58, juv.]). Station 8 (CAS 86253–86255, 86257, 86259–86260 [♂ ♂]; 86256, 86258 [♀ ♀] [II/27/58]). Stream south of Station 9 (CAS 86304–86305 [III/20/58, ♂ ♂]).

Remarks. These hylas are present in fair numbers along the seasonal stream courses in early spring. When collected, all were bright green, blending well with the grasses in which they were found. When placed in the dark, some became a darker, olive green, some a steel gray or gray-brown, others showing no change, although all were in the same container. Some became much paler when narcotized with chlorotone. Just-metamorphosed individuals were a light gray-green or tan.

In Khuzistan Province the eggs seem to be laid in late February and early March, metamorphosis being completed in March and April. No hylas were seen after mid-June. No intensive search was made for them, however. Water remains throughout the year in sinkholes and small caves in the gypsum formations, as well as in permanent streams. The water temperature is 22°–26°C. during the hottest part of the summer. A retreat is thus provided for the amphibians of the area.

CAS 86304 has a supernumerary forelimb attached to the right side of the pectoral girdle and innervated from the right side.

Family RANIDAE

Genus **Rana** Linnaeus

Rana ridibunda ridibunda Pallas.

Rana ridibunda Pallas, 1771, Reise Rus. Reich., vol. 1, p. 458. (Type locality: Gurev, north coast of the Caspian Sea.)

Rana ridibunda ridibunda, Mertens, 1925, Abh. Senck. Ges., vol. 39, p. 55.

Known range. The whole of Europe except northwest and central Italy; western Asia as far east as northern West Pakistan, Afghanistan, and eastern Turkestan (USSR); North Africa (Boulenger, 1891).

Material examined (59). Vicinity of Station 1 (CAS 86353 [♂]; 86354, 86359, 86364–86365 [♀ ♀] [April, 1958]). Stream 1.9 km. north of junction

of road between Station 1 and Station 9 and road between Station 1 and Ahwaz (CAS 86307–86311 [III/21/58, ♂♂]). Stream 16.9 km. north of Station 1, on road to Station 9 (CAS 86313–86315 [III/21/58, juv.]). Fifteen kilometers north of Station 1, on road to Station 9 (CAS 86290, 86292 [juv.]; 86291 [♀]; 86293–86294 [♂♂] [III/10/58]). Station 2 (CAS 86363 [III/28/58, ♀]). Stream near Station 3 (CAS 86267 [III 14/58, ♂]). Pools near Station 3 (CAS 86619–86620, 86628 [♀♀]; 86621–86622, 86627 [♂♂] [Sept.–Oct., 1958]). Stream on road to Station 5 (CAS 86264–86265 [III/13/58, juv.]). Stream 9 km. above Station 7 (CAS 86261 [III/13/58, ♀]). Station 8 (CAS 86268–86272, 86274–86278, 86280–86282 [♀♀]; 86273, 86279, 86283 [♂♂] [III/12/58]; 86287 [III/27/58, ♀]). Stream south of Station 9 (CAS 86301–86302, 86306 [♀♀]; 86303 [juv.] [III/20/58]). Station 13 (CAS 86316–86319 [III/21/58, juv.]). Stream near Station 17 (CAS 86357 [♂]; 86358 [♀] [III 28/58]). Station 21 (CAS 86411 [♀]; 86412–86413 [juv.] [VI/8/58]).

Remarks. This frog is numerous in the foothill regions in all the permanent streams throughout the year, and in the seasonal drainages in the spring. Sinkholes and small caves in the gypsum provide retreats from the extreme summer heat and contain the only permanent water in many localities. During the day these frogs are found sitting in the water or in the vegetation along the banks of pools and streams.

Eggs are laid in late February and March, most metamorphosis being completed by early April. A few metamorphosing tadpoles were seen as late as May 23 in an area where the stream course was dry except for small, rapidly shrinking pools.

Unsuccessful attempts were made to induce ovulation in mature females in September. Ovaries showed little response despite injections of both amphibian and mammalian anterior pituitary.

These frogs may be an important part of the diet of many predators, since they are one of the few prey species available in large numbers throughout the year.

Seventeen of the 59 frogs in this series have a light vertebral stripe. In 40 of the 59 the tibiae do not overlap when the legs are at right angles to the body, and in several of these they do not even touch (a character independent of age or sex).

Rana cyanophlyctis Schneider.

Rana cyanophlyctis Schneider, 1799, Hist. Amph., vol. 1, p. 137.

Known range. Widely distributed from southern Arabia and eastern Iran to the Malay Peninsula, and from the Himalayas (to 6,000 feet) to Ceylon.

Material examined (6). Station 34 (CAS 86562 [♂]; 86561, 86563–86566 [♀ ♀] [X/21/58]).

Remarks. The frogs of this series have a single white streak on the hinder side of the thighs, the dark pigment below this streak giving a mottled appearance rather than forming a distinct second dark streak. The interorbital space is only slightly narrower than the upper eyelid in these specimens.

Stomach contents included beetles, beetle larvae, a mole cricket, spiders, and other arthropod remains.

Class REPTILIA

Order Chelonia

Family Emydidae

Genus **Clemmys** Ritgen

Clemmys caspica caspica (Gmelin).

Testudo caspica Gmelin, 1774, Reise durch Russland, vol. 3, p. 59, pls. 10–11. (Type locality: Hircania, northern Iran.)

Clemmys caspica caspica, Schmidt, 1939, Field Mus. Nat. Hist., Zool. Ser., vol. 24, p. 89.

Known range. Iran, from the southern borders of the Caspian Sea to the Persian Gulf; Iraq; northern Arabia and Bahrein Island.

Material examined (7). Station 3 (CAS 86634 [III/14/58, ♀]) Station 17 (CAS 86629 [♀]; 86639 [♂] [X/26/58]; 86635 [♀]; 86636–86637 [juv.] [III/28/58]; 86638 [V/23/58, juv.]).

Remarks. The carapace of CAS 86639 is misshapen, the left side much more depressed than the right, several shields having a shriveled appearance.

These turtles were collected at only two localities. Turtles, apparently of this species, were seen on a stream bank near Isfahan, and in streams near Persepolis. Presumably they are to be found wherever there is permanent water over successive years in the foothill regions.

In the small lake (75–100 meters in diameter) where most of these specimens were collected, there were hundreds of these turtles of all ages, as well as numbers of *Rana ridibunda*. This appears to be a permanent lake, but in summer diminishes to half its spring size. Reeds grow along its northern margin, and there is considerable aquatic vegetation in the lake itself.

One of the females laid an egg on June 4, and another on June 26. These eggs were about 40 mm. by 30 mm. The shells were brittle, and of a china-like texture. CAS 86629 and 86639 were found copulating on October 26, in the mud at the edge of the small lake.

Man may be the principal predator on the adults of this species. Al-

though the flesh is apparently not eaten, the eggs are considered a potent ingredient in eye medicine. It is possible many turtles are killed for the eggs they contain, as eye ailments abound in southern Iran.

Order SQUAMATA

Suborder Sauria

Family Gekkonidae

Genus **Eublepharis** Gray

Eublepharis macularius (Blyth).

(Figure 8.)

Cyrtodactylus macularius Blyth, 1854, Jour. Asiat. Soc. Bengal, vol. 23, p. 737. (Type locality: Salt Range, Punjab.)

Eublepharis macularius, Anderson, 1871, Proc. Zool. Soc., p. 163.

Known range. Northwestern India, Pakistan, and Afghanistan to southern Turkmen (USSR), Iran, and Iraq.

Material examined (16). Road between Station 1 and Station 2 (CAS 86333 [IV/15/58, ♂, DOR]; 86360 [juv.]; 86361, 86366 [♀ ♀]; 86362 [♂] [IV/19/58]; 86381 [IV/28/58, ♂]; 86383 [V/13/58, juv.]; 86385 [V/21/58, ♀]; 86396, 86398 [♂ ♂]; 86397 [♀] [V/22/58]; 86416 [V/26/58, ♂]; 86507 [VIII/20/58, ♀]). Road between Station 1 and Batwand (CAS 86337 [IV/18/58, ♂, DOR]; 86382 [V/13/58, ♀]; 86384 [V/20/58, ♂]).

Remarks. Each dorsal tubercle is encircled by a single ring of slightly enlarged, juxtaposed dorsal scales.

In those specimens in which the tail has been rejuvenated, the tail is swollen just distal to the break, the rejuvenated portion lacking tubercles, and having smaller, less regular ventral scales.

Preanal pores are present in the females, although much less distinct than in the males.

The postanal sacs and deep axial pouches contain many small mites in all specimens.

All specimens were collected on surfaced roads between 8 p.m. and midnight. They were first seen in mid-April on roads along which collecting had been done during the same hours for the preceding six weeks. The lizards were fairly numerous on these roads until the end of May. None were seen from June until August 20, when a single specimen was collected.

These lizards were never encountered during the day, although many rocks were overturned in the area. Deep crevices in the gypsum probably provide a retreat during the day.

During the period that these lizards were seen on the roads, grasshoppers were also present on the roads in large numbers. Also on the roads at the

same hours were scorpions, solpugids, and large spiders. Stomach contents included these animals as well as beetles and other arthropods. They have been reported to eat other lizards (Smith, 1935) and may prey on the various small geckoes of this region.

The foxes which abound in this area were observed eating lizards of this species which had been hit by automobiles, and probably prey regularly on them.

When captured, these lizards give a loud, prolonged squeek and attempt to bite. They often defecate, wrapping the short tail around the hand of their captor. This may occasionally enable them to drop the tail.

CAS 86361, 86366, 86385, 86397, 86507 contain eggs.

Air temperature recorded when these lizards were collected varied from 32.0° to 34.4°C. The road surface temperatures were 32.6° to 36.4°C., and were usually at least 2°C. higher than the surrounding soil temperatures, which ranged from 30.2° to 35.0°C.

The critical maximum temperature (as defined by Cowles and Bogert, 1944) was recorded for one individual (CAS 86507) and found to be 42.6°C. The lizard was placed on an asphalt surface which had a temperature of

FIGURE 8. *Eublepharis macularius.*

48.6°C., in the direct sunlight. The air temperature was 44.6°C. The anal temperature at the start of the experiment was 35.6°C. The lizard was tethered so that it could not reach the shade which was visible a short distance away. The anal temperature at which all efforts to reach the shade became uncoordinated and ineffective was considered the critical maximum. Anal temperatures were taken with a Schulthize rapid-reading thermometer. The critical maximum temperature was reached four minutes after the initiation of the experiment. Efforts to reach the shade began immediately upon exposure of the animal to direct sunlight, and were unceasing until collapse. Considerable moisture was passed from the vent, and the mouth opened only when the animal was on the point of collapse. After the anal temperature was recorded, the animal was removed to the shade where it subsequently recovered. No paralysis was noted after recovery, but what, if any, other functional impairments resulted from exposure to high temperature was not determined.

Genus **Cyrtodactylus** Gray

Cyrtodactylus scaber (Hayden).

Stenodactylus scaber Hayden, 1827, in Rüppell, Atlas Reise Nörd. Africa, Rept., p. 15, pl. 4, fig. 2. (Type locality: vicinity of Tor, Sinai.)

Cyrtodactylus scaber, Underwood, 1954, Proc. Zool. Soc., London, pp. 469–492.

Known range. From Egypt to northwest India; Arabia, along the Persian Gulf.

Material examined (9). Station 1 (CAS 86431 [VI/23/58, ♂, on a wall]; 86513 [IX/7/58, juv.]; 86626 [Nov., 1958, juv., in a house]). On wall on a house near Station 3 (CAS 86532 [IX/10/58, juv.]; 86533 [IX/11/58, juv.]). Station 19, on wall of I.O.E.P.C. guest house (CAS 86481 [VIII/14/58, ♀]; 86482 [♀]; 86483 [♂] [VIII/15/58]). I.O.E.P.C. guest house at Station 24 (CAS 86558 [X/5/58, juv.]).

Remarks. There is a vertebral series of tubercles, smaller than the 10–12 rows of longitudinally and transversely arranged tubercles. This median row usually extends from the scapular to the pelvic region.

This species is the most common house-gecko in the foothill region. It was quite common on walls of houses from late June through November, becoming active during the late daylight hours. It was frequently seen at night just beyond the circle of light thrown by an outdoor fixture, darting forward occasionally to capture a moth or other insect attracted to the light.

Hatchlings were common in mid-August. One female laid two eggs, ovoid, white, and with brittle shells, in late August. These were 10.5 mm. long, the greatest width being 7 mm.

Cyrtodactylus agamuroides (Nikolsky).

(Figure 9.)

Gymnodactylus agamuroides Nikolsky, 1899, Ann. Mus. Zool. Imp. Acad. Sci. St. Pétersbourg, ser. 4, pp. 384–385.

Known range. Eastern Iran.

Material examined (1). Station 29 (CAS 86370 [IV/26/58, ♂]).

Remarks. The single specimen was found under a rock by village boys.

Nikolsky (1899) designates no holotype specimen, nor type locality. The three syntypes are from Neizar in Seistan, Pendseh-Sara, and Duz Abad, eastern Kerman Province, Iran. The only record of this form subsequent to that of Nikolsky is by Wettstein (1951) who lists it from Kerman.

The present specimen differs from *C. kotschyi* in that the limbs are longer, the dorsal tubercles are approximately as broad as long, the abdominal scales are about 22–24 at mid-body (30 in *C. kotschyi*), and it has subquadrangular spots in three longitudinal series, with a less distinct lateral series, while *C. kotschyi* has angular transverse bars. It differs from *C. fedtschenkoi* and *C. longipes* in having the snout longer than the distance between eye and ear, fewer longitudinal rows of abdominal scales (28–30 in *C. fedtschenkoi*); scales of limbs are not keeled, dorsal tubercles are small, rounded, smooth to weakly keeled, subconical, rather than large and subtrihedral; there are but 4 preanal pores (28–36 preanal and femoral pores in *C. fedtschenkoi*); *C. fedtschenkoi* has dorsal crossbars. It is distinguished from *C. kermanensis* in that the diameter of the eye goes into the length of the snout only 1¼ times (2–2¼ in *C. kermanensis*), in that the mental shield is triangular rather than pentagonal, and in that it lacks strong keels on the dorsal tubercles. It is different from *C. zarudnyi* in having the first pair of chin shields in contact behind the mental; *C. zarudnyi* has triangular, strongly keeled tubercles, and lacks dark dorsal markings. It differs from *C. kachhensis* in having smaller, less strongly keeled tubercles, having regular infracaudal plates, and fewer longitudinal series of abdominal scales (30–40 in *C. kachhensis*). It is distinct in *C. caspius,* which has large, strongly keeled, trihedral tubercles, about 20 femoral and preanal pores, and indistinct dorsal crossbars. *Cyrtodactylus brevipes* has shorter limbs and imperfect longitudinal dusky bands on the dorsum, formed of arrowhead-shaped marks.

It does not differ significantly from Nikolsky's description of *Gymnodactylus agamuroides.*

At least eight species of *Cyrtodactylus* have been recorded from eastern Iran (*C. scaber, C. fedtschenkoi, C. kirmanensis, C. zarudnyi, C. longipes, C. caspius, C. brevipes,* and *C. agamuroides*). The types of these species should be examined to determine whether or not these are all specifically distinct forms.

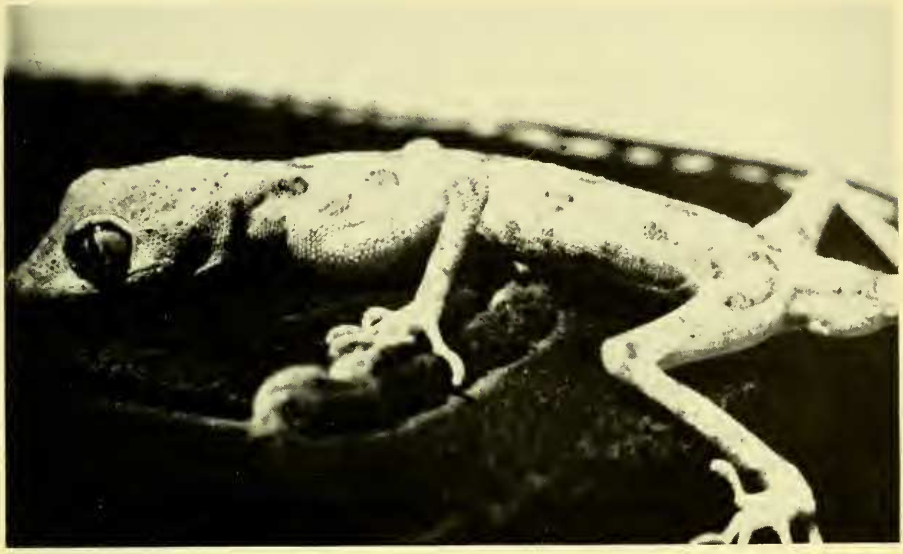


FIGURE 9. *Cyrtodactylus agamuroides.*

Genus **Bunopus** Blanford

Bunopus tuberculatus Blanford.

Bunopus tuberculatus BLANFORD, 1874, Ann. Mag. Nat. Hist., ser. 4, vol. 13, p. 454. (Syntypes from Bahu Kalat, Mand, and near Bampur, southeastern Iran.)

KNOWN RANGE. Syria, Iraq, eastern Arabia, southern Iran, Afghanistan, Pakistan; to 3,000 feet.

MATERIAL EXAMINED (6). Station 25 (CAS 86492 [VIII/17/58, juv.]; 86524 [VIII/22/58, juv.]; 86536 [♀]; 86537 [♂] [IX/13/58]). Station 35 (CAS 86590–86591 [X/20/58, ♂♂]).

REMARKS. Leviton and Anderson (1963) have demonstrated that Blanford's genus (*Bunopus*) of tuberculate geckoes is distinct from the non-tuberculate *Alsophylax* of Fitzinger.

In the present specimens the imbricate scales of the belly and lower surfaces of the limbs and tail have their posterior borders distinctly denticulated.

During the day these lizards were found in burrows among the roots of shrubs in the active sand-dune areas. They were active about 9:00 P.M. on the surface of the sand, particularly near the base of shrubs, on October 20 at Minab. Blanford (1876) collected this species in Baluchistan in houses and under rocks.

This species may be distinguished from *Cyrtodactylus heterocercus* (Blanford) and *Bunopus persicus* (Nikolsky) by the lack of postmental shields. The scales of the belly are smooth in *Bunopus tuberculatus*, but described as keeled in *B. persicus*.

Coloration in life: sandy gray above, the juveniles distinctly barred with chocolate-brown; six crossbars, broader than the interspaces, between the shoulders and pelvis, becoming broken and less distinct in adults. A brown crescent curves around the nape and passes through the eyes. There is dark pigment in the temporal areas, and in front of the eyes, the lips banded or spotted with brown. The hind limbs are crossbarred with brown, the forelimbs mottled. The tail is crossbarred above, flecked with brown below. The throat and belly are immaculate white.

Genus **Microgecko** Nikolsky

Microgecko helenae Nikolsky.

(Figure 10.)

Microgecko helenae Nikolsky, 1907, Ann. Mus. Zool. Acad. Imp. Sci. St. Pétersbourg, vol. 10, pp. 265–268, pl. 1, figs. 4, 4a. (Type locality: Arabistan [= Khuzistan], Iran.)

Known range. Khuzistan Province, southwest Iran. A doubtful record from southeast Iran (Mertens, 1956), and recorded from west Pakistan (Minton, 1962).

Material examined (1). Station 4 (CAS 86408 [V/13/58, ♂]).

Remarks. This small gecko was first described from southwestern Iran by Nikolsky (1907). Mertens (1956) tentatively assigned a single, poorly preserved specimen from southeastern Iran to this species, regarding this specimen as congeneric with *Tropiocolotes Peters*. His specimen lacked dark crossbars on the dorsum. Minton (1962) includes *Tropiculotes helenae* (*sic*) in the fauna of west Pakistan, and states that it is common.

The present specimen agrees with Nikolsky's description of *Microgecko helenae* in all particulars except that the tail is slender and crossbarred throughout. Nikolsky's specimens were reported as having thick tails, the distal third being solid black. His illustration clearly shows that the tail is regenerated, and it is possible that all nine of his specimens lacked the original tail.

CAS 86408 has been described in detail in a previous paper (Anderson, 1961), in which I concurred with Mertens in placing *Microgecko* in the synonymy of *Tropiocolotes*. I now feel that while *M. helenae* Nikolsky and *T. steudneri* Peters are congeneric, they are probably generically distinct from *T. tripolitanus* Peters (the type species of *Tropiocolotes*).

This tiny gecko was collected on a surfaced road at 8:00 p.m. The road surface was 37.6°C., the surrounding soil 35.2°C., and the air 34.2°C. It was exceedingly agile, able to jump several inches.

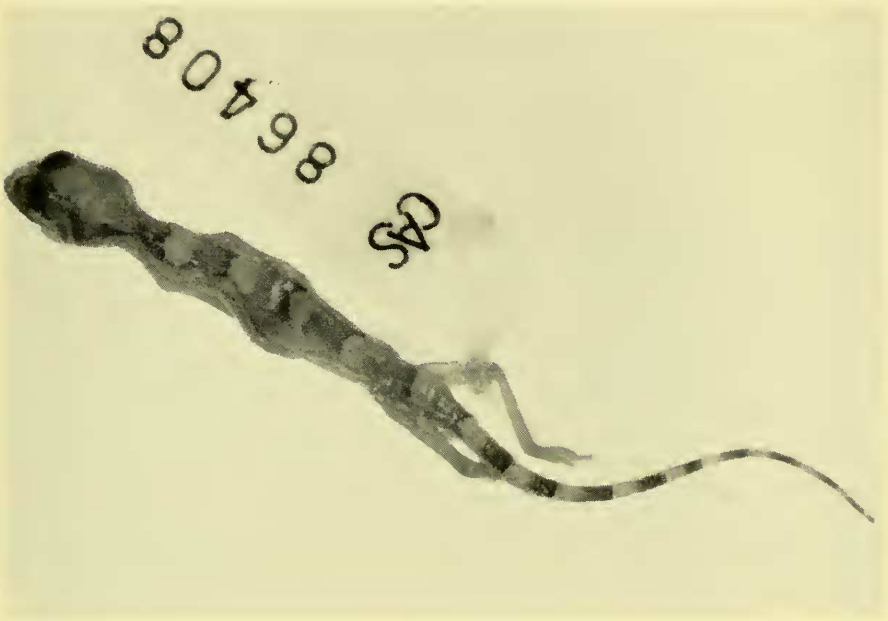


Figure 10. *Microgecko helenae.*

Genus **Hemidactylus** Oken

Hemidactylus persicus Anderson.

Hemidactylus persicus Anderson, 1872, Proc. Zool. Soc. London, p. 378, fig. 2. (Type locality: probably Bushire, Iran, according to Blanford, 1876.)

Known range. Pakistan, Iran, Iraq, Arabia.

Material examined (9). Road between Station 1 and Station 2 (CAS 86499–86500 [VIII/20/58, ♀ ♀]). Road between Station 1 and Station 16 (CAS 86377 [V/12/58, ♀]; 86421 [VI/14/58, ♀]). Station 4 (CAS 86414 [♂]; 86415 [♀] [V/26/58]; 86424 [VI/24/58, ♂]; 86454–86455 [VI/13/58, ♀ ♀]).

Remarks. The females in this series contain ovarian eggs; CAS 86377 contains a large egg in each oviduct, the largest 13 mm.

The stomach of CAS 86455 contains grasshopper remains almost exclusively.

These lizards were found at night from May through August on the roads of the foothill region. The air temperatures were 31.4°–36.4°C., the road surfaces 35.4°–38.0°C., and the soil at the road edges 30°–35°C., the road surface usually 3°–5° higher than the surrounding soil.

This species occurs occasionally as a house gecko in this region, but less frequently so than *Cyrtodactylus scaber.*

Genus **Phyllodactylus** Gray

Phyllodactylus elisae Werner.

Phyllodactylus elisae Werner, 1895, Verh. Zool.-Bot. Ges. Wien, vol. 45, p. 14, pl. 3. fig. 1. (Type locality: ruins of Ninevah, near Mosul, Iraq.)

Known range. Western Iran and eastern Iraq.

Material examined (18). Station 4 (CAS 86432 [VI/24/58, ♂]). Station 12 (CAS 86339–86340, 86352 [IV/18/58, ♂♂]; 86435, 86437–86438 [♂♂]; 86436, 86439–86443 [VII/6/58]; 86525–86529 [VIII/22/58, ♂♂]).

Remarks. Stomach contents of this series seem to be exclusively spiders. There were many spiders in the culvert where these lizards were collected on several occasions. These geckoes are quite agile, and proved adept in avoiding capture in the dark culvert. The tails are extremely fragile, and although care was taken in collecting them, few were captured with complete tails. Several individuals were present on the stone walls of the culvert each time it was visited. A small trickle of water ran through the culvert in the summer. The lizards were usually in the middle, or darkest area of the culvert.

Family Agamidae

Genus **Agama** Daudin

Agama nupta de Filippi.

Agama nupta de Filippi, 1843, Giorn. Ist. Lomb. e Bib. Ital., vol. 6, p. 407. (Type locality: Persepolis, Iran.)

Known range. Pakistan, Afghanistan, Iran, Iraq.

Material examined (23). Station 1 (CAS 86250 [II/27/57, juv.]; 86321 [III/26/58, juv. ♂]; 86332 [IV/6/58, juv. ♂]; 86334–86335 [juv. ♂♂]; 86336 [juv. ♀] [IV/16/58]; 86512 [IX/7/58, juv.]). School building above road between Station 1 and Station 2 (CAS 86508 [VIII/20/58, juv.]). Road between Station 1 and Station 16 (CAS 86372 [V/12/58, ♂]). Road between Station 1 and Batwand (CAS 86434 [VII/6/58, ♀]). Station 3 (CAS 86531 [IX/4/58, ♂]). Station 6 (CAS 86502, 86510 [♀♀]; 86504, 86509 [♂♂] [VIII/21/58]). Station 7 (CAS 86252 [juv. ♂]; 86266 [♀] [III/13/58]). Station 9, above Karun River (CAS 86559 [X/11/58, ♀]). Station 19 (CAS 86623 [XI/4/58, ♂]). Station 26 (CAS 86474 [VIII/9/58, juv.]; 86476 [juv.]; 86477 [♂] [VIII/10/58]). Station 27 (CAS 86511 [IX/5/58, juv.]).

Remarks. The spines on the neck, around the ear, and the posterior temporal region are absent in the very young specimens. The scales become much more strongly keeled and mucronate with age, and the spines become

increasingly pronounced. The occipital scales are relatively much larger in the young specimens than in older individuals.

The young have distinct dark crossbars in the area between the pectoral and pelvic girdles, these breaking up into less distinct reticulations as the animal matures.

Mites cluster in the folds on the neck, and under the imbricate scales of the adults.

These lizards were seen to eat both insects and herbaceous vegetation. The identifiable stomach contents were primarily orthopterous and coleopterous insects.

CAS 86266 and 86559 contained ovarian eggs, the largest measuring 3.5 mm. CAS 86502 and 86510 had eggs in the oviducts, measuring up to 26 mm. Thus gravid females were collected in March, August, and October, indicating that eggs are laid at least in the spring and in the autumn in this region.

The smallest juveniles (44 mm. snout–vent length) were seen in early September, but half-grown individuals were regularly observed from March through November.

This species is abundant in the foothill region, inhabiting rock outcrops where there are deep crevices. It is common on walls, cemetery monuments, and buildings. Almost always, one or more of these lizards are to be found living on and about each oil company staff bungalow at Masjid-i-Suleiman. These hang head down on the walls or screens and make brief forays onto the ground to capture insects. At night and during the hottest part of the day they retreat under the eaves.

These lizards were noted occasionally on the trunks of the few trees in the foothills. One was seen in a small gypsum cave. They are present in considerable numbers on the terrace of Persepolis, living in and about the ruins.

This is an extremely wary species, retreating quickly into a crevice (always close at hand) when alarmed. Observations (particularly of those living near buildings) indicate that the area of activity of an individual generally has a radius of less than fifty feet. The basking area, as indicated by the distribution of fecal pellets, is usually not more than five to ten feet in diameter.

From February through the summer a very definite shift in the periods of activity was observed. In late February and March this species was seen only at midday and early afternoon, when the air temperature was about 30°C. They were seen then basking on rocks, exposing the maximum surface area to the direct sunlight. In the afternoon they were raised on their forelegs, facing the sun so that the light rays would strike the head and belly, and the angle of reflection from the surface of the rock exposed them to the maximum reradiation. Later in the spring basking was initiated progres-

sively earlier in the day and continued later into the afternoon. In the summer the lizards retired during the hottest hours, their activity restricted to the earliest daylight hours and to late afternoon in July and August. The anal temperature of a basking individual at 6:35 A.M. on August 20 was 27.2°C. when the air was 22.4°C. and the substrate 25.5°C. By mid-September they were again active until later in the morning and retired only during the midday heat, becoming active again early in the afternoon, when air temperatures were still over 40°C., and the rocks on which they were seen considerably higher. In mid-October they were active at midday.

Observations to determine the critical maximum temperature for this species were carried out with seven individuals (see p. 436). A critical maximum temperature between 43.8° and 48.5°C. was indicated (table 1).

During these observations the lizards became lighter in color, respiration became more rapid, and the mouth was open. Attempts to reach the shade were sporadic at first, becoming continuous as the anal temperature rose. The animal usually defecated when the anal temperature was between 37.0° and 42.6°C. Normal reactions were somewhat impaired before the actual critical maximum temperature was reached.

TABLE 1. *Summary of observations to determine the critical maximum temperature of* Agama nupta.

Sex	*Snout-vent length (mm.)*	*Air temp. (°C.)*	*Substrate temp. (°C.)*	*Initial anal temp. (°C.)*	*Time elapsed (min.)*	*Critical maximum temp.* (°C.)*
♂		41.0	50.0	33.5	9	48.5
♂	142	42.2	50.0	32.1	17	47.8
♂	158	41.6	50.5	30.4	17	46.8
♀	142	41.2	50.0	34.6	9	44.0
♀	136	41.0	49.6	33.6	11	44.6
juv.	64			34.8	4	43.8
juv.	62	41.8	48.6	34.8	6	46.8

*As defined by Cowles and Bogert (1944).

Agama agilis Olivier.

(Figure 11.)

Agama agilis OLIVIER, 1807, Voy. Emp. Otho., vol. 4, p. 394, pl. 24 (in atlas), fig. 2. (Type locality: vicinity of Baghdad, Iraq.)

KNOWN RANGE. Pakistan, Afghanistan, Iran, Iraq, Arabia, along the Persian Gulf. 0–6,000 feet.

Material examined (65). Station 1 (CAS 86251 [III/1/58, ♀]; 86320 [III/26/58, ♂]; 86328 [IV/7/58, ♀]; 86331 [IV/6/58, ♀]; 86466–86467 [VII/23/58, juv.]). Tang-i-Golestan, on road between Station 1 and Ahwaz (CAS 86338 [IV/18/58, ♂]). Road between Station 1 and Batwand (CAS 86348 [♀]; 86349–86351 [♂♂] [IV/18/58]). Road south of Shustar (CAS 86373 [IV/18/58, ♀]). Road between station 1 and Station 16 (CAS 86399–86400, 86402 [♂♂]; 86401, 86418 [♀♀] [V/23/58]). Station 4 (CAS 86447–86448 [juv.]; 86459 [♀] [VI/28/58]). Station 5 (CAS 86341–86346 [♂♂]; 86347 [♀] [IV/17/58]; 86389–86391 [♂♂]; 86392–86395, 86422–86423 [♀♀] [V/22/58]; 86425–86426 [VI/5/58, ♀♀]; 86456, 86458 [VI/28/58, ♂♂]; 86493–86497 [VIII/19/58, juv.]; 86498 [VIII/20/58, juv.]). Station 6 (CAS 86457 [VI/28/58, ♂], 86461–86462 [VII/4/58, ♂♂]). Road near Shustar (CAS 86464 [VII/18/58, ♀]). Road from Station 15 to Tembi River (CAS 86427–86429 [VI/20/58, ♂♂]). Tembi River, near Station 15 (CAS 86449 [VI/20/58, juv.]). Golf course at Station 16 (CAS 86556 [X/5/58, ♂]). Road near Station 17 (CAS 86403–86404, 86406 [♂♂]; 86405, 86419 [♀♀] [V/23/58]). Station 19 (CAS 86487 [VIII/16/58, juv. ♂]). Station 20 (CAS 86503 [VIII/23/58, juv. ♂]). Station 27 (CAS 86322 [Mar., 1958, ♂]; 86625 [XI/1/58, juv.]). Station 28 (CAS 86374 [IV/22/58, ♀]).

Remarks. Taxonomic separation of the several geographic populations of this polymorphic species must await the examination of more material. The statistical significance of the variation in the scale rows of the various populations has been pointed out (Leviton and Anderson, 1961). Wettstein's (1951) designation of the subspecies "*agilis*," "*isolepis*," and "*sanguinolenta*" is unacceptable, since he does not explain this partition on morphological grounds.

The present series from southwest Iran has a range of 76–95 (mean 86.1) scales around the body; six specimens from the Dasht-i-Margo Desert of Afghanistan (Leviton, 1959) have 72–76 (mean 74.8) scale rows; nine specimens from Kandahar, Afghanistan (Leviton and Anderson, 1961) have 60–74 (mean 65.0) rows; three specimens in the collection of the U.S. National Museum, designated as *Agama sanguinolenta*, have 56–66 (mean 59.7) scale rows. These last three specimens, from Turkestan (USSR), are otherwise indistinguishable from *A. agilis*.

Blanford (1881) remarks that two specimens from Persia in the Berlin Museum are distinguished from other Persian specimens by having smooth ventral scales, and having 80–85 scales round the body, the "common Persian form" having only 70–75. None of Blanford's (1876, 1881) specimens came from southwest Iran, and apparently the exact localities of the specimens in the Berlin Museum were not known. In many of the present specimens the keels on the ventral scales are indistinct.

CAS 86374, from southeastern Iran, has 67 scale rows, and is tentatively assigned to this species.

The measurements and scale counts for the present series and for the three *A. sanguinolenta* are presented in table 3. I wish to thank Dr. Doris Cochran of the U.S. National Museum for the loan of the three specimens of *A. sanguinolenta*.

Blanford (1881) states that the Central Asian specimens are distinguished from all the Persian examples by more strongly developed keels throughout, and that this coincides with Pallas' description of *Lacerta sanguinolenta*, and Eichwald's description of *Agama sanguinolenta*. He states that some of the largest males which he collected in the desert between Sind and Jaisalmir (northwestern India) have the strongly keeled and mucronate scales of *A. sanguinolenta*. He concludes that the form from "Persia, Baluchistan, and Sind" is the true *Agama agilis* of Olivier, and that the *A. sanguinolenta* of the countries north of Iran and east of the Caspian (with which *A. aralensis* is identified by Peters and apparently by Strauch) is a variety of *A. agilis* with more strongly keeled and spinose scales.

All females collected between March 1 and July 18, 1958, were gravid (no adult females were collected after July 18). CAS 86418 had eggs in both ovaries, even though a clutch of 8 eggs had been laid in captivity, and CAS 86464, which laid 12 eggs in captivity, had eggs in both ovaries. CAS 86419 had laid 6 eggs in captivity, and had eggs in the left ovary but none in the right; there was a single egg in the right oviduct. In 8 specimens the oviducts are greatly enlarged, but contain no eggs, the lizards having only small ovarian eggs. Some specimens had over 20 eggs in each ovary, the largest 6.5 mm. in diameter; the largest oviducal eggs were 11 mm. Captive females laid eggs between June 2 and July 26. These eggs were 13–15 mm. in diameter, the shells soft when laid, but hardening rapidly.

Juvenile specimens were not seen until late June, becoming increasingly numerous thereafter. Both newly hatched and half-grown juveniles were seen in late October and early November.

Stomach contents included grasshoppers, ants, beetles, and other arthropod remains.

In none of these specimens is there any indication of the tail having been regenerated.

This species was first seen in the foothills in early March, becoming very numerous by mid-April. Although often found within a few yards of *A. nupta*, their microhabitats do not overlap, *A. agilis* preferring small rock piles in relatively flat areas, and never seen on the ridges and outcrops frequented by *A. nupta*. During the hours of their activity, one of these lizards is to be seen on almost every one of the small piles of stones erected to mark the boundaries of grain fields. Occasionally they are seen in low thorny shrubs.

In some areas, where there are suitable rock piles, the lizards may be less than 50 feet apart.

This species was never encountered in active sand dune areas, but was collected near the beach at Binak, on the narrow coastal plain along the Persian Gulf.

Agama agilis is far less wary than *A. nupta,* and can be approached to within a few feet, particularly when basking, and collected by means of a noose.

Color and pattern changes, apparently correlated with changes in anal and ambient temperatures, were observed. During the earliest morning hours, when the lizards were basking, pressed close to rock or soil surfaces, and exposing a maximum surface area to the direct rays of the sun, they were dark in color, the dorsal pattern of interrupted crossbars very pronounced. The lowered albedo may permit greater heat absorption at the lower morning temperatures. The lizards were sluggish at this time, and could often be collected simply by picking them up. The broken pattern may serve to make them less conspicuous to predators in the hours when they are least wary, and shadows are long.

Anal temperatures when the lizards were basking and sluggish were 30.8°–40.4°C.; air temperatures were 29.8°–37.0°C., soil and rock surfaces 28.3°–39.2°C.

During the hottest hours of their activity they are extremely light in color, the males a light sandy color with no discernible pattern, the females showing some of the crossbars. Considerable orange pigment is seen on the tail at these times. The animals raise themselves on all four legs, well off the rock surfaces, and are tilted at an angle which exposes the minimum surface area to direct radiation. During these periods anal temperatures were 41.2°–45.2°C.; air temperatures were 38.0°–41.6°C., rock and soil temperatures 40.0°–50 +°C. During the hottest hours at which lizards were seen on rocks and in bushes, very little active foraging was observed. Sitting in low shrubs, away from the hot ground, may enable them to effectively lower the body temperature. One individual collected in a bush had an anal temperature of 38.0°C., while those on rocks in the vicinity had anal temperatures of 41.2°C. They were seen in bushes only during the hottest hours of their activity, sitting vertically so that the sun would strike the belly at a small angle.

Most foraging activity seems to take place when anal temperatures are between 38° and 42°C. The voluntary maximum temperature (as defined by Cowles and Bogert, 1944) appears to be about 44.8°C.

That the color change undergone by these animals is under nervous control is apparent when they are collected with a noose during the heat of the day. They are very light in color when seen sitting on the rocks; when noosed they darken almost instantly, and show much more contrast in the

dorsal pattern. When taken in the hand from the noose they blanch within seconds to a color much lighter than when originally seen, the males becoming almost white, the pattern disappearing. The males are much darker on the throat and on the sides of the belly than on the dorsum, and these areas deepen in intensity, and have a blue cast when the lizards are held in the hand.

The seasonal shift in activity is very noticeable, and corresponds with that observed for *A. nupta*. Captive individuals placed in an outdoor observation enclosure were active throughout the midday hours in late September. The daily maximum temperatures were still high at this time, but there was no longer the prolonged heating of the substrate, an important factor in maintaining the high ambient temperatures of the summer months.

In observations to determine the critical maximum temperature (see p. 436), the lizards showed striking color and pattern changes. As anal temperatures rose, males faded gradually from a light gray with discernible crossbars, to nearly white as the critical maximum was approached, the pattern fading completely. The tail became increasingly orange as the animal grew lighter; the blue ventral areas, hardly visible at the start of the observations, became intensely blue. Females initially had dark brown to dark red-brown or orange-brown crossbars, which became much lighter, sometimes bright orange, as the temperature rose. A critical maximum temperature between 47.5° and 49°C. was indicated (table 2). One individual recovered

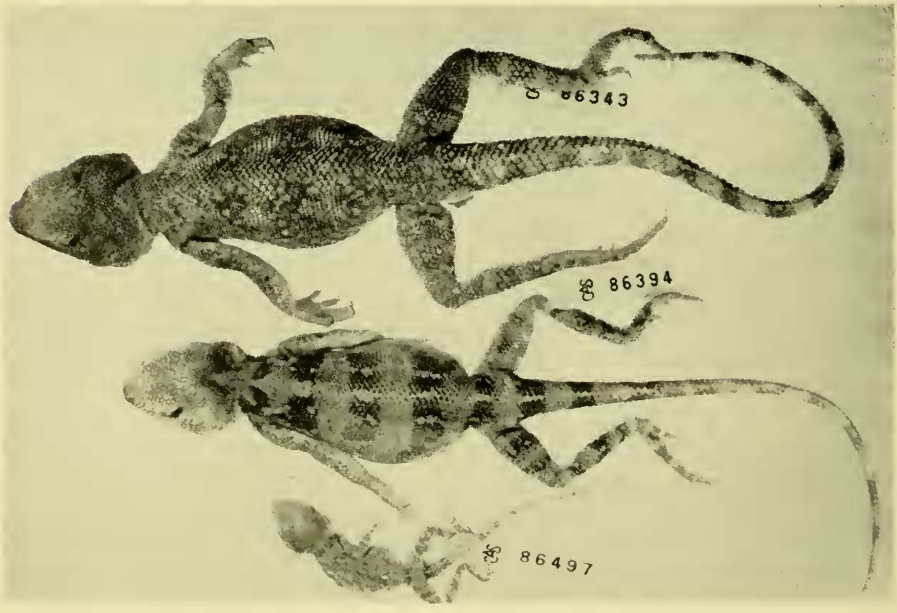


FIGURE 11. *Agama agilis*. Top to bottom: male, female, juvenile.

after having an anal temperature of 49.8°C., but coordination had probably failed before this temperature was reached.

TABLE 2. *Summary of observations to determine the critical maximum temperature of* Agama agilis.

Sex	*Snout-vent length (mm.)*	*Air temp. (°C.)*	*Substrate temp. (°C.)*	*Initial anal temp. (°C.)*	*Time elapsed (min.)*	*Critical maximum temp.*[3] *(°C.)*
♂	93	43.5	48.9	32.2	10	48.8
♂	92	43.8	51.0	36.6	7	49.0
♀	74	44.2	50.0	35.2	11	48.5
♂	82	38.2	45.0–49.4	35.6	12	48.4
♂	92	39.6	50.0	35.6	17	47.5

3. As defined by Cowles and Bogert (1944).

TABLE 3. *Measurements (in mm.) and counts for specimens of* Agama agilis.

CAS number	*Sex*	*Scale rows*	*Upper labials*	*Lower labials*	*Preanal pores*	*Snout-vent length*	*Tail length*
86320	♂	82	16	18	12		
86322	♂					65	101
86338	♂	84	17/18	20/21	30		
86341	♂	82	16/18	17	21	83	134
86342	♂	82	17	19/18	24	84	126
86343	♂	81	18	18/19	10	86	141
86344	♂	85	20/18	19/20	20	84	140
86345	♂	86	19/20	19	18	90	133
86346	♂	86	18/19	18	25	87	138
86349	♂	80	17	16/18	26	82	127
86350	♂	92	15/17	16	28	91	145
86351	♂	82	15	17	11	84	122
86389	♂	81	17/16	17/16	28	89	143
86390	♂	82	16/18	19	25	88	135
86391	♂	90	18	19	20	84	141
86399	♂	88	16	18/17	28	94	139
86400	♂	86	18/17	19	43	93	144
86402	♂	81	16/14	16/15	25	89	142
86403	♂	84	16/17	17/16	24	83	146
86404	♂	86	16	17	24	79	130

TABLE 3 (cont.). *Measurements (in mm.) and counts for specimens of* Agama agilis.

CAS number	*Sex*	*Scale rows*	*Upper labials*	*Lower labials*	*Preanal pores*	*Snout-vent length*	*Tail length*
86406	♂	88	17	19/20	20	69	115
86427	♂	88	19/17	19	28	86	137
86428	♂	86	19	17	21	88	
86429	♂	84	17/18	16/18	29	90	146
86456	♂	82	16/17	19/18	52	93	149
86457	♂	87	18	18	17	94	
86458	♂	95	19/18	19	9	92	154
86461	♂	86	18/17	17	31	82	134
86462	♂	80	16/18	18	24	92	147
86487	♂	89	17	19/17	16	56	98
86503	♂	85	16	15	7	56	91
86556	♂	84	18/17	19/20	9	88	133
86251	♀	83	17/19	17/18	8	70	102
86328	♀	95	17/16	20/18	8	64	96
86331	♀	89	20/17	17/20	9	69	98
86347	♀	83	18	18/19	11	72	114
86348	♀	95	15/16	17/18	9	72	113
86373	♀	87	18/19	18/17	8	73	102
86392	♀	82	19/17	17/18	10	89	133
86393	♀	81	19	20	10	86	122
86394	♀	82	16/15	18/19	9	75	107
86395	♀	86		12/14	10	64	93
86401	♀	87	17/16	15/16	13	85	111
86405	♀	87	17/18	18	8	79	108
86418	♀	95	17/16	17	11	73	111
86419	♀	92	16	18/19	9	76	106
86422	♀	93	17/18	18	13	72	107
86423	♀	80	16	18/17	8	75	116
86425	♀	95	16/17	18/19	9	80	116
86426	♀	83	19/18	19	9	83	124
86459	♀	88	19/17	17/15	9	74	102
86464	♀	90	16/17	19/17	8	83	114
86447	juv.				8	33	47
86448	juv.				9	32	43
86449	juv.				10	32	53
86466	juv.					30	43
86467	juv.					29	43
86493	juv.	89	17	19/17	6	38	
86494	juv.	85	16	17/16	11	43	68

TABLE 3 (cont.). *Measurements (in mm.) and counts for specimens of* Agama agilis.

CAS number	*Sex*	*Scale rows*	*Upper labials*	*Lower labials*	*Preanal pores*	*Snout-vent length*	*Tail length*
86495	juv.	94	18/19	19/17	8	44	68
86496	juv.	90	20/18	19	10	38	53
86497	juv.	76	18/17	18	8	36	53
86498	juv.	88	16/15	16	10	40	65
86625	juv.	78 +	17/15	16/15			
Range		76–95 (86.1)	15–20	12–21	6–52	29–94	43–154
USNM number		*Data for specimens of* Agama sanguinolenta.					
14352 Caspi, Krasnowodsk		66	20	17/16	24	111	159
14361 Turkestan		57	20/19	18/16	17	93	142
37219 New Margelan, Turkestan	juv.	56	16/17	17	18	65	120

Agama persica Blanford.

(Figure 12.)

Agama persica BLANFORD, 1881, Proc. Zool. Soc. London, p. 674, pl. 49 (syntypes came from Deh Bid and Kazerun, Iran, neither designated as the type locality).

KNOWN RANGE. Jordan; Iraq; Iran; Arabia, along the Persian Gulf.

MATERIAL EXAMINED (11). Station 23 (CAS 86534–86535 [IX/12/58, juv.]). Station 25 (CAS 86486 [juv.]; 86505–86506 [♂♂] [VIII/17/58]; 86521 [♀]; 86522–86523 [juv.] [VIII/22/58]; 86538–86539 [juv.]; 86540 [♂] [IX/13/58]).

REMARKS. This series agrees well with Blanford's (1881) description. The preanal pores form a single row, occasionally with one or two additional pores in the row above or below, and are present in all adults. These specimens do not differ significantly from eight individuals from Arabia (Abqaiq, Qatif, and Dhahran). The ventral scales of the Iranian series are more strongly keeled than are those of the Arabian series, and the dorsal scales are more strongly mucronate, the apex of the muero more upturned. There are 73–89 scales round the middle of the body in the Iranian lizards (mean 82.2), 73–82 in the Arabian series (mean 76.3). Blanford gives the range as 75–85 in his type series. Four of the five females of the Arabian series lack preanal pores.

I collected this species in only two localities, both active dune areas.

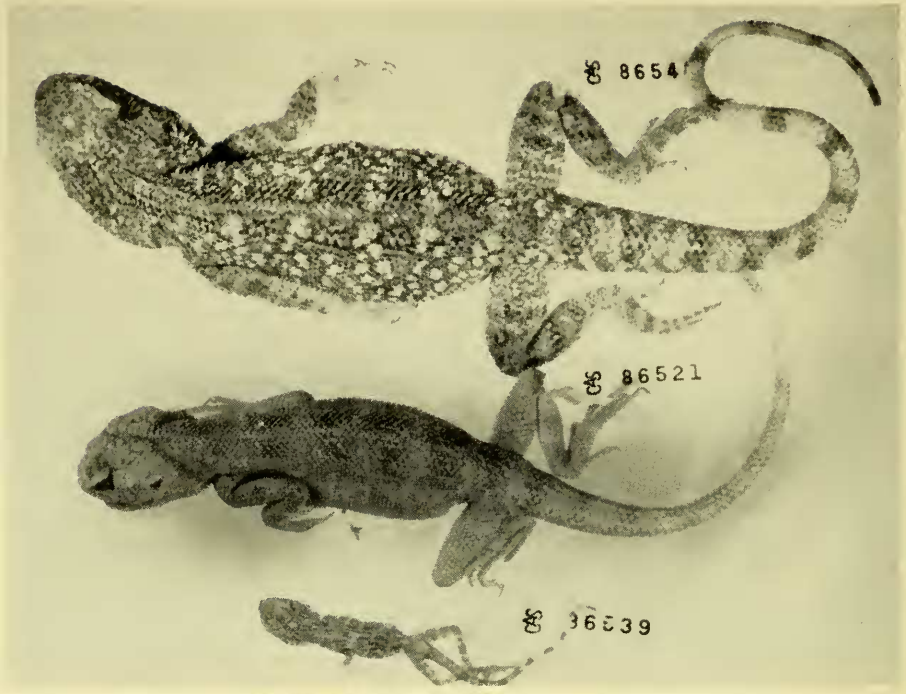


Figure 12. *Agama persica*. Top to bottom: male, female, juvenile.

Agama agilis was never observed in such a habitat. Active over the entire dune area, these lizards were most numerous on the fringes near low shrubs. Two were collected in a bush where they had apparently been feeding on the foliage, for one had leaves in its mouth. They were active on the dunes at midmorning in August. The anal temperature of one foraging individual was 40.8° when the air was 39.6°, and the sand 48.2°C. They were still active when the air had reached 42° and the sand well over 50°C.

Stomach contents included ants, beetles, and orthopterans.

The female, collected in late August, had 13 eggs in the left ovary, the largest 2 mm. in diameter.

These lizards are quite belligerent when cornered, leaping off the ground toward their pursuer, the mouth wide open, the dewlap extended.

In three observations to determine the critical maximum temperature (see p. 436), it appeared to be between 46.1° and 49.2°C. (table 4).

During these observations the lizards became much lighter in color; the pattern faded, the tail pattern becoming yellow, the blue areas on the throat and venter becoming more intensely blue. The mouth was opened wide, and the dewlap extended.

A male narcotized with chlorotone became much darker on the dorsal surface, the linked, diamond-shaped markings on the vertebral line becoming

much less obvious, light crossbars appearing against the dark ground color, and a general light mottling appearing over the dorsum. The tail became much lighter. The light, sandy pattern of the belly faded completely. All of the blue areas became intense, the blue coloration diffusing high onto the maxillary region, over the snout, and lightly onto the temporal region. The sides of the belly and the chin became intensely blue, the dew-lap and throat becoming black.

Table 4. *Summary of observations to determine the critical maximum temperature of* Agama persica.

Sex	Snout-vent length (mm.)	Air temp. (°C.)	Substrate temp. (°C.)	Initial anal temp. (°C.)	Time elapsed (min.)	Critical maximum temp.[4] (°C.)
♂	99	43.6	51.2	34.0	7	46.1
♂	94	44.6	50.0	34.6	8	47.2
juv.	45	44.6	54.4	41.1	4	49.2

4. As defined by Cowles and Bogert (1944).

Agama ruderata Olivier.

Agama ruderata Olivier, 1807, Voy. Emp. Othm. Eg. et Pers., vol. 2, p. 429, pl. 29, fig. 3 (syntypes from Iran and northern Arabia).

Known range. Israel; Syria; Turkey; Jordan; Iraq; Arabia; Iran; Afghanistan.

Material examined (1). Station 26 (CAS 86475 [VIII/9/58, juv.]).

Remarks. The single juvenile specimen was collected on the terraee of Persepolis. No *A. agilis* were seen in this region.

Genus **Uromastix** Merrem

Uromastix loricatus (Blanford).

Centrotrachelis loricatus Blanford, 1874, Proc. Zool. Soc. London, p. 660. (Type locality: Bushire, Iran.)

Uromastix loricatus, Boulenger, 1885, Cat. Liz. Brit. Mus., vol. 1, p. 409, pl. 32.

Known range. Iraq, Iran.

Material examined (6). Road between Station 1 and Ahwaz (CAS 86379 [Apr., 1958, ♂, DOR]). Road between Station 1 and Station 16 (CAS 86463 [V/23/58, juv.]; 86470 [VII/6/58, ♀]). Station 14 (CAS 86380 [April, 1958, ♂, DOR]). Station 15 (CAS 86468 [VI/20/58, ♀]). Near Station 22 (CAS 86469 [VII/6/58, ♂]).

Remarks. Both females have ovarian eggs, the largest 3 mm. in diameter.

These large lizards were seen from mid-April through mid-August on plains and in valleys where soil conditions permit excavation of the burrows in which they live. These burrows are often more than four feet in length, and more than one foot deep at their termination, and usually have two or more sharp bends. The lizards were most frequently observed basking on a mound of soil at the mouth of the burrow. They were often seen at midday during the summer when no other reptiles were active. They are easily alarmed, retreating quickly into the burrow. Occasionally they were seen foraging some twenty-five yards from the burrow. The burrows were often in areas where a low, hirsute herb (family Labiaceae) was growing. The leaves of these plants always showed that the lizards had fed on them where they occurred near the burrows. Fecal pellets in the basking area contained only this plant.

When threatened with capture, these animals whip the heavy, spiny tail laterally with rapid, violent strokes.

The juvenile specimen was collected at midday, when the surface of the road on which it was seen had a temperature of 57°C., the surrounding soil 57.5°C. When captured after considerable activity, the animal had an anal temperature of 45.8°C. A female captured June 20 was actively foraging in a plowed grain field at 9:25 A.M., when the air temperature was 35°, the soil 46.8°C. The anal temperature was 43.2°S.

A female collected at 3:40 P.M. on June 6, was active on a road having a surface temperature of 53.5°C., the surrounding soil 53.0°, and the air 47.5°C. When collected, the animal was nearly white, the bright orange areas of the back very pronounced.

Individuals basking in the early hours of the day were extremely dark in over-all coloration, those active in the hottest part of the day almost white, having large areas of bright orange across the dorsum. In captivity they demonstrated the ability to change from a very dark to a nearly white coloration, this change being correlated with temperature. This would seem to indicate a change in the albedo of the animal, allowing it to absorb more heat when temperatures are below the optimum for activity, and less when temperatures have exceeded this level.

Three captive adults showed signs of discomfort when anal temperatures rose above 44°C. They were very light in color at this temperature, respiration was rapid, their mouths were open, the tongues bright red.

Three adults recovered from experiments to determine the critical maximum temperature (see p. 436) after the anal temperature had risen to 49.1°–50.2 + °C. (table 5), apparently without suffering ill effects. They were observed for a relatively short period following recovery, however.

The general body color at the beginning of the observations was a light gray. They became gradually lighter as the temperature rose, becoming nearly white, the orange pigment in the thoracic area increasingly pronounced.

TABLE 5. *Summary of observations to determine the critical maximum temperature of* Uromastix loricatus.

Sex	Snout-vent length (mm.)	Air temp. (°C.)	Substrate temp. (°C.)	Initial anal temp. (°C.)	Time elapsed (min.)	Critical maximum temp.[5] (°C.)
♂	252	45.4	50 +	34.8	32	49.5
♀	220	45.4	50 +	34.5	24	50.2 +
♀	215	46.2	50 +	35.8	51	49.1

5. As defined by Cowles and Bogert (1944).

Family VARANIDAE

Genus **Varanus** Merrem

Varanus griseus (Daudin).

Tupinambis griseus DAUDIN, 1803, Hist. Nat. Rept., vol. 8, p. 352. (Type locality: Egypt.)

Varanus griseus, BOULENGER, 1885, Cat. Liz. Brit. Mus., vol. 2, p. 306.

KNOWN RANGE. North Africa; Arabia and southern Asia to the Caspian Sea, and eastward through Afghanistan and Pakistan to the desert regions of northwest India, 0 feet–4,000 feet.

MATERIAL EXAMINED (2). Station 25 (CAS 86630–86631 [IX 13/58, juv.]).

REMARKS. This species was seen occasionally, always from a distance, in the foothill region. They were active in sand dune areas in August and September during the early daylight hours. They appear to forage systematically on the dunes over several hundred yards, entering one burrow after another in search of rodents and reptiles. One juvenile was tracked some 500 yards before it was found backing out of a burrow. When overtaken after a considerable chase, it stopped, hissing loudly, thrashed the tail from side to side, and ran directly at me. It had just eaten a lizard, the tail of which could be seen protruding from the throat.

The anal temperature of a foraging juvenile which had just entered a burrow was 38.5°, the air 31.8°, and the surface of the sand 45.4°C.

One captive individual was observed while it ate a dead mouse. The lizard braced itself on stiff forelegs, making short forward lunges with its body, the jaws maintaining a firm grip on the mouse. The prey was slowly worked farther into the throat in this manner until it was completely within the mouth and throat. There followed a series of contortions of the neck and body as the food was worked down the long throat.

Smith (1935) says that 15–20 eggs are laid, buried in the sand, or placed at the end of a burrow.

Family AMPHISBAENIDAE

Genus **Diplometopon** Nikolsky

Diplometopon zarudnyi Nikolsky.

Diplometopon zarudnyi NIKOLSKY, 1907, Ann. Mus. Zool. Acad. Sci. Petrograd, vol. 10, p. 277, figs. 1–3. (Type locality: Nasrie, Khuzistan, Iran.)

KNOWN RANGE. Iraq; southwestern Iran (Khuzistan Province); Arabia, along the Persian Gulf.

MATERIAL EXAMINED (1). Station 25 (CAS 86514 [VIII/22/58]).

REMARKS. The single specimen was found several inches below the surface of the sand. Whether it had been in a burrow or in loose sand was not determined.

Family LACERTIDAE

Genus **Acanthodactylus** Wiegmann

Acanthodactylus cantoris Günther.

Acanthodactylus cantoris blanfordi Boulenger.

Acanthodactylus cantoris, BLANFORD (in part), 1876, Zool. E. Persia, vol. 2, p. 163, pl. 26, fig. 3.

Acanthodactylus cantoris blanfordi BOULENGER, 1918, Bull. Soc. Zool. France, p. 154 (syntypes from Bam, Iran, and Mand, Pakistan).

KNOWN RANGE. The species ranges from northwest India through Pakistan and Afghanistan to western Iran and Arabia. The subspecies, *A. c. blanfordi*, is found in southwestern Pakistan and southeastern Iran.

MATERIAL EXAMINED (13). Station 32 (CAS 86600, 86602, 86604, 86607–86608 [♂♂]; 86601, 86603, 86605–86606, 86609 [♀♀] [X/23/58]). Station 33 (CAS 86588–86589 [X/18/58, ♂♂]). Station 35 (CAS 86592 [X/21/58, ♂]).

Acanthodactylus cantoris schmidti Haas.

Acanthodactylus cantoris schmidti HAAS, 1957, Proc. Calif. Acad. Sci., vol. 29, pp. 72–73. (Type locality: Dhahran, Saudi Arabia).

KNOWN RANGE. Dhahran, Abqaiq, Qatif, Shimal, and north of Tebuk, Saudi Arabia; Mesopotamian Plain, Khuzistan Province, southwestern Iran.

MATERIAL EXAMINED (25). Station 25 (CAS 86488, 86490 [♂♂]; 86491 [♀]; 86489 [juv.] [VIII/17/58]; 86515–86520 [VIII/22/58]; 86541–86542, 86544, 86547, 86549, 86551–86552 [♀♀]; 86543, 86545–86546, 86548, 86550, 86553–86555 [♂♂] [IX/13/58]).

Remarks. Boulenger (1921) gives the range of dorsal scale rows in *A. cantoris blanfordi* as 38–44, the ventrals as 12–14. The present specimens from southeastern Iran (Bandar Abbas, Shagu, and Minab) have 36–44 (mean 39.6) dorsals and 12–14 (mean 12.6) ventrals. They agree with Boulenger's description of this subspecies, the type series of which was collected by Blanford in southeastern Iran and southwestern Pakistan.

The specimens from southwestern Iran (Khuzistan Province) have 38–51 (mean 44.1) dorsals and 14–16 (mean 15.5) ventrals. The two series were compared with the paratypes of *A. c. schmidti* in the collection of the California Academy of Sciences (table 7). *Acanthodactylus c. schmidti*, from the northeast coast of Arabia, was found to have 38–54 (mean 44.8) dorsals, and 13–18 (mean 14.9) ventrals. Thus, the Khuzistan series appears to be closer to *A. c. schmidti* than to *A. c. blanfordi*. It is not possible to evaluate the biological significance of the several apparently distinct populations of *A. cantoris* on the basis of presently available material.

The following females contain ovarian eggs: CAS 86516, 86541, 86542, 86544, 86547, 86549, 86551, 86552, 86601, 86603, 86605, 86606, 86609. This indicates eggs are laid in late fall, and perhaps in the winter. The fact that no small juveniles were seen is additional evidence that hatching does not occur in spring and summer. Blanford (1876) found numerous young in November, and concluded that eggs probably hatch in the autumn.

Stomach contents include ants, termites, spiders, beetles, and blossoms. CAS 86516 has considerable sand, as well as insect remains in the colon.

This species was encountered only in active sand dune areas. Their tracks, characterized by the continuous mark left by the tail, are almost always to be seen in the morning in dune regions. These lizards run rapidly from bush to bush, exploring more slowly the area within the shade and protection of shrubs. They were never seen to burrow in the loose sand.

Anal temperatures of active lizards ranged from 38.0° to 41.8°C.; air temperatures during the periods of activity ranged from 27.4°, at which time activity was just beginning, to 42.0°C., the sand surface 34.0°–48.2°C. Above these air and sand temperatures, the lizards could be seen resting quietly in the shade of low shrubs. When sand surface temperatures were 50 +° in the sun, they were often about 35°C. in the shade of bushes. In summer (when these observations were made) the activity takes place only in the early morning and late afternoon, the animals retreating to burrows around the bases of shrubs during the hottest hours. On October 20, at 2:45 P.M., when the sand surface was over 50°C., and there were no lizards on the surface, the sand four inches below the surface was 41.8°C. A lizard was turned out of a burrow by digging at about that depth.

In three experiments to determine the critical maximum temperature for this species (see p. 436) a critical maximum of 47–49°C. was indicated (table 6). Observations were conducted in a metal box, the bottom of

which was covered with sand. When first placed on the sand, these lizards performed the typical lacertid behavior of resting the weight on the elbow joint, while raising the forefeet off the sand surface. No attempts were made at burrowing.

TABLE 6. *Summary of observations to determine the critical maximum temperature of* Acanthodactylus cantoris.

Snout-vent length (mm.)	*Air temp. (°C.)*	*Substrate temp. (°C.)*	*Initial anal temp. (°C.)*	*Time elapsed (min.)*	*Critical maximum temp.*[6] *(°C.)*
47	42.5	59.6	37.6	3	47.0
43	44.6	57.0	35.8	3	49.0
47	44.6	55.5	39.0	3	49.0

6. As defined by Cowles and Bogert (1944).

TABLE 7. *Measurements (in mm.) and counts for specimens of* Acanthodactylus cantoris.

CAS number	*Sex*	*Scale rows*		*Femoral pores*	*Snout-vent length*	*Tail length*
		Dorsals	*Ventrals*			
			Southeastern Iran			
86588	♂	36	13	20	39	84
86589	♂	41	13	22/21	47	
86592	♂	40	12	20/21	53	106
86600	♂	44	12	21/20	58	
86602	♂	40	13	20/22	49	99
86604	♂	37	12	26/23	43	
86607	♂	38	12	22/19	45	96
86608	♂	40	13	22	46	
86601	♀	40	12	19/21	51	
86603	♀	40	12	20/19	54	96
86605	♀	38	14	19	44	86
86606	♀	42	13	19/20	45	
86609	♀	39	13	18/19	39	
Range		36–44 (39.6)	12–14 (12.6)	18–26	39–58	84–106
			Khuzistan Province			
86488	♂	42	15	17/21	47	88

TABLE 7 (cont.). *Measurements (in mm.) and counts for specimens of* Acanthodactylus cantoris.

CAS number	*Sex*	*Scale rows*		*Femoral pores*	*Snout-vent length*	*Tail length*
		Dorsals	*Ventrals*			
86490	♂	45	14	18/20	43	79
86543	♂	45	14	19/18	42	80
86545	♂	45	16	20/19	52	85
86546	♂	46	15	20	49	96
86548	♂	44	14	19/20	55	102
86550	♂	43	16	21/22	58	110
86553	♂	46	15	19/20	74	
86554	♂	39	15	21/20	80	159
86555	♂	39	16	21/20	85	
86491	♀	38	16	20	47	88
86541	♀	43	16	21/20	38	72
86542	♀	44	16	19/18	42	79
86544	♀	51	16	21/19	45	
86547	♀	44	16	19	52	
86549	♀	45	16	20/21	52	93
86551	♀	46	16	20/22	56	103
86552	♀	47	16	20/21	58	109
86489	juv.	46	16	22/20	36	
Range		38–51 (44.1)	14–16 (15.5)	18–22	36–85	72–159
		Dhahran (paratypes of A. c. schmidti *Haas)*				
84268		40	18	22		
84270	♀	46	14	18		
84530	♀	50	16	21/20		
84598		40	15	23		
84600		42	13	18/20		
84601	♂	43	14	20/19		
84603		40		20		
84604		38	16	20/22		
84605	♀	52	14	21		
84606		54	14	21		
84608		47	14	18/19		
84609	♀	45	16	20/22		
Range		38–54 (44.8)	13–18 (14.9)	18–23		

Genus **Eremias** Wiegmann

Eremias guttulata watsonana Stoliczka.

Eremias (Mesalina) watsonana Stoliczka, 1872, Proc. Asiat. Soc. Bengal, p. 86. (Type locality: between Karachi and Sukkur, Sind.)

Eremias guttulata watsonana, Smith, 1935, Fauna Brit. Ind., vol. 2, p. 389.

Known range. *Eremias guttulata* ranges from northeastern Africa, including Egypt, the Sudan, and Ethiopia, through southwest Asia and Arabia to northwest India. *Eremias g. watsonana* is known from Iran, Afghanistan, West Pakistan, and northwest India (Smith, 1935).

Material examined (25). Station 1 (CAS 86248 [III/2/58, ♀]; 86288 [III/19/58, ♀]; 86326 [♀]; 86329 [♂] [IV/7/58]; 86640 [XI/30/58, ♂]). Road between Station 1 and Station 16 (CAS 86323 [III/28/58, ♂]; 86386–86387 [V/23/58, juv.]; 86645 [VII/6/58, ♂]). Station 3 (CAS 86249 [III/14/58, ♂]). Station 4 (CAS 86452 [VI/28/58, juv.]). Station 6 (CAS 86453 [VII/4/58, juv.]). Road between Station 1 and Ahwaz (CAS 86465 [VII/18/58, ♀]). Station 8 (CAS 86325 [IV/2/58, ♀]). Station 11 (CAS 86444 [VII/6/58, juv.]). Station 15, near Tembi River (CAS 86430 [♂]; 86450–86451 [juv.] [VI/20/58]). Station 19 (CAS 86484–86485 [VIII/16/58, ♀ ♀]). Station 26 (CAS 86478 [VIII/10/58, juv.]). Station 29 (CAS 86368–86369 [IV/26/58, juv.]). Station 30 (CAS 86367 [IV/25/58, ♂]). Station 31 (CAS 86587 [X/18/58, ♂]).

Remarks. In CAS 86368 the collar is distinct only at the sides of the throat. The scales of the tibia are not keeled in CAS 86484.

Females collected between March 2 and April 7, and on August 16 contain eggs (CAS 86248 and 86326 have eggs in the oviducts, the largest 9 mm. in diameter. CAS 86288, 86325, 86484, and 86485 contain ovarian eggs, the largest 3 mm. in diameter).

Hatchlings were seen from late April through November, half-grown individuals not appearing until late May or June. This indicates that eggs are laid in early spring and late summer (perhaps throughout the summer). Apparently hatching does not begin until midspring, and continues through early autumn (although perhaps no hatching occurs in midsummer). Adult size is attained by the following spring.

Stomachs contained ants and spiders.

This is the most common lacertid in the foothills of Khuzistan. It seems to prefer the less rocky areas, being abundant on hillsides, in valleys, and along stream courses. They are agile in avoiding capture, often making no attempt to seek safety under rocks close at hand. If hard pressed, they will run under a rock or down small holes in the soil.

They become active early in the day and remain active late in the evening, their small size and correspondingly greater surface area enabling

them to rapidly reach optimum activity temperature. As air and substrate temperatures increase, activity is confined to the shade of rocks and small plants, quick dashes being made across areas of direct sunlight. As with the agamid lizards of the region, a shift in activity from midday in the spring to early morning and later afternoon in summer, and again to midday in the fall, was observed. Their small size, and their utilization of very small shaded areas gives them a longer period of activity than the larger species. The very young individuals are active earlier, and retreat to cover sooner in the hottest hours than do the adults. This species was found active about

TABLE 8. *Measurements (in mm.) and counts for specimens of* Eremias guttulata watsonana.

CAS number	*Sex*	*Scale rows*		*Upper labials*	*Femoral pores*	*Snout-vent length*	*Tail length*
		Dorsals	*Ventral*				
86249	♂	44	10	8	11	50	111
86323	♂	43	10	8	12	49	
86329	♂	43	10	9	12/11	51	108
86367	♂	45	9	8	13/14	44	
86430	♂	46	10	8	11	50	
86445	♂	46	10	9	13		
86587	♂	41	10	9/11	13	39	93
86640	♂	43	10	8	13	53	
86248	♀	44	10	8	12		
86288	♀	45	10	8	12/11	57	
86325	♀	46	10	9/8	11	53	
86326	♀	44	10	8	11	57	
86465	♀	42	10	8	11	39	75
86484	♀	43	10	9/8	12	41	78
86485	♀	39	10	7/8	11	38	80
86368	juv.	42	10	10	12	21	
86369	juv.	43	10	9	11	20	
86386	juv.	42	10	9	12	27	47
86387	juv.	47	10	9/10	12	25	46
86444	juv.	44	10	9	13		
86450	juv.	44	10	8	11	31	58
86451	juv.	44	10	8	12	30	64
86452	juv.	42	10	9	10	25	
86453	juv.	47	10	8	11	35	75
86478	juv.	44	10	9	11/12	26	54
Range		39–47	9–10	7–11	10–14	20–57	46–111

9:00 P.M. in mid-August in the light of a gas flare. The air temperature was 36.4°C., the ground surface 33.6°C.

This lacertid was never seen in active sand dune areas.

Genus **Ophisops** Ménétries

Ophisops elegans elegans Ménétries.

Ophisops elegans Ménétries, 1832, Ct. Rais. Obj. Zool. Voy. Caucase, p. 63. (Type locality: near Baku, Caspian Sea.)

Known range. The species ranges through Turkey, Syria, Israel, Cyprus, Iraq, the Caucasus, northern Iran (south into the Zagros Mountains) and West Pakistan. *Ophisops e. elegans* is known from Syria, Iraq, Iran, and West Pakistan.

Material examined (4). Station 36 (CAS 86471 [VIII/1/58, ♂]). Station 37 (CAS 86472 [VIII/2/58, ♀]; 86473 [VIII/5/58, ♀]). Tang-i-Gurguda, near Gach Saran, at approximately 4,500 feet (CAS uncatalogued specimen [Autumn, 1960, ♀, collected by Howard T. Anderson]).

Remarks. The occipital shield is somewhat wider than the interparietal in all of these specimens. In CAS 86471 the collar is distinct across the throat; in the others it is distinct only at the sides.

The three females contain ovarian eggs.

In the foothills near Tehran, the habits and habitat of this species appear to be similar to those of *Eremias guttulata watsonana* in southern Iran.

Table 9. *Measurements (in mm.) and counts for specimens of* Ophisops elegans elegans.

CAS number	*Sex*	*Scale rows*	*Longitudinal ventral plates*	*Upper labials*	*Femoral pores*	*Snout-vent length*	*Tail length*
86471	♂	32	8	9/8	14/11		
86472	♀	34	8	9/8	10	49	
86473	♀	32	8	8	10/9	46	91
Uncatalogued Specimen	♀	30	8	8	10/9	40	67

Family Scincidae

Genus **Scincus** Gronovius

Scincus conirostris Blanford.

Scincus conirostris Blanford, 1881, Proc. Zool. Soc. London, p. 677, fig. 1. (Type locality: Tangyak, 7 mi. s. of Bushire, Iran.)

Known range. Southwestern Iran and eastern Iraq.

Material examined (2). Station 19 (CAS 86479 [♂]; 86480 [juv.] [VIII/16/58]).

Remarks. The present specimens agree with Blanford's original description. Scale counts are as follows: CAS 86479: 9 upper labials, 7 lower labials, 27 scale rows a mid-body; CAS 86480: 9 upper labials, 7/6 lower labials, 28 scale rows at mid-body.

Khalaf (1960) considers *S. conirostris* to be a subspecies of *S. scincus*, but fails to state why he does so, and cites no other authority. I have not compared *S. scincus* with *S. conirostris*.

I saw this species on a single occasion at only one locality. One was collected about one inch below the surface of the loose sand of an active dune. The track is characterized by the broad, undulating mark left by the tail. The second specimen was seen running across the sand, and rapidly buried itself at the base of a thorny shrub.

Observations to determine the critical maximum temperature for this species were carried out in a metal box, the bottom of which was covered with sand. Most attempts by the lizards to escape were launched against the side of the box, and few attempts were made at burrowing. They suffered no apparent ill effects after recovering from anal temperatures of 49.8° and 50.0°C. (table 10).

Table 10. *Summary of observations to determine the critical maximum temperature of* Scincus conirostris.

Sex	Snout-vent length (mm.)	Air temp. (°C.)	Substrate temp. (°C.)	Initial anal temp. (°C.)	Time elapsed (min.)	Critical maximum temp.[7] (°C.)
♂	82	42.1	57.4	31.2	9	49.8
juv.	51	43.4	58.6	37.0	4	50.0

7. As defined by Cowles and Bogert (1944).

Genus **Mabuya** Fitzinger

Mabuya aurata septemtaeniata (Reuss).

Euprepis septemtaeniata Reuss, 1834, Mus. Senck., vol. 1, p. 47, pl. 3, fig. 1. (Type locality: Massaua.)

Mabuya aurata septemtaeniata, Mertens, 1924, Abh. Ber. Mus. Magdeburg, vol. 3, p. 377.

Known range. *Mabuya aurata* ranges from Abyssinia through southwest Asia to West Pakistan (Smith, 1935). *Mabuya a. septemtaeniata* occurs in Iraq, Iran, and the Persian Gulf coast of Arabia.

Material examined (3). Road between Station 1 and Station 16 (CAS 86388 [V/23/58, ♀]). Station 5 (CAS 86417 [VI/5/58, ♂]). Darrous, north of Tehran (CAS uncatalogued specimen [Autumn, 1960, juv., collected by Howard T. Anderson]).

Remarks. CAS 86388 contains ovarian eggs. The stomach of this specimen contains orthopteran and other arthropod remains, as well as a portion of its own tail. Weber (1960) found that stomach contents of specimens collected in Iraq consisted primarily of spiders. Smith (1935) states that *Mabuya aurata* is viviparous.

This species was seen on several occasions in the foothill region, from early March through late August, usually where rock crevices provided a ready retreat.

Table 11. *Measurements (in mm.) and counts for specimens of* Mabuya aurata septemtaeniata.

CAS number	*Sex*	*Upper labials*	*Lower labials*	*Scale rows*	*Snout-vent length*	*Tail length*
86388	♀	7	7/8	34	74	
86417	♂	8/7	7	33	80	119
Uncatalogued Specimen	juv.	7	8/7	37	37	58

Genus **Ophiomorus** Duméril and Bibron

Ophiomorus brevipes (Blanford).

(Figure 13.)

Zygnopsis brevipes Blanford, 1874, Ann. Mag. Nat. Hist., vol. 14, p. 33. (Type locality: Sa'adatabad, Sarjan, between Kerman and Shiraz, Iran.)

Ophiomorus brevipes. Boulenger, 1887, Bull. Soc. Zool. France, vol. 12, p. 525.

Known range. Eastern Iran; Turkmen (S.S.R.); Afghanistan.

Material examined (1). Station 35 (CAS 86593 [X/21/58, ♂]).

Remarks. This lizard was observed to move with snake-like movements beneath the surface of loose sand. The fresh tracks of this species were seen entering a burrow about 9:30 A.M., October 21.

Snout-vent length: 78 mm.

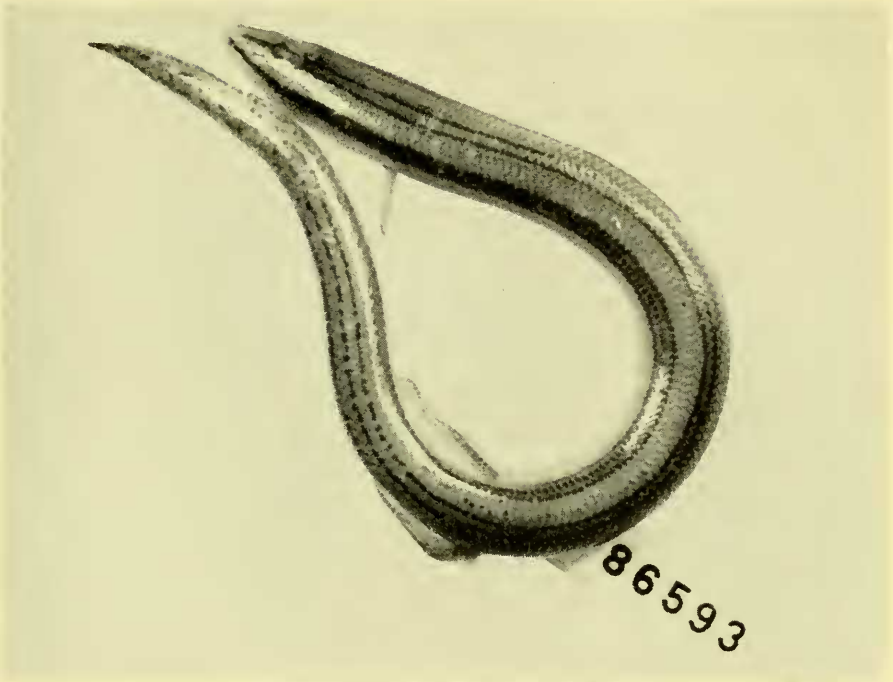


Figure 13. *Ophiomorus brevipes.*

Suborder SERPENTES

Family Colubridae

Genus **Coluber** Linnaeus

Coluber rhodorachis (Jan).

Zamenis rhodorachis Jan, 1865, in de Filippi, Viagg. Pers., p. 356. (Type locality. Iran.)

Coluber rhodorachis, Parker, 1931, Ann. Mag. Nat. Hist., ser. 10, vol. 8, p. 516.

Known range. Egypt to Somaliland; Sinai; Arabia; Syria; Iraq; Iran; Turkmen (S.S.R.); Afghanistan; Pakistan and northwest India to the western Himalayas.

Material examined (6). Station 1 (CAS 86409 [VI/8/58, ♂, DOR]; 86420 [VI/27/58, ♀]). Road between Station 1 and Station 16 (CAS 86371 [V/12/58, ♂]). Station 2 (CAS 86433 [VII/4/58, ♀]; 86624 [XI/1/58, juv.]). Station 18 (CAS 86586 [X/26/58, ♀]).

Remarks. Two upper labials (5th and 6th) enter the eye. CAS 86420 has eggs in the oviduct, the largest 39 mm. in diameter; CAS 86433 contains ovarian eggs, largest 9 mm.

CAS 86586 had unidentifiable snake remains in the stomach.

All of the specimens in this series have the crossbarred pattern. There is a pattern variation in the same region, in which the snake is a uniform brown to olive, with a single pink or orange vertebral stripe. A captive snake in the Masjid-i-Suleiman hospital was of this pattern.

This was the most frequently seen snake in the foothills. It appears to be strictly diurnal.

CAS 86409 was found dead on a road on a June evening. The mouth of this snake had been sewn firmly closed with heavy black thread. Inquiry of people familiar with local customs disclosed that this is fairly common practice, a snake with the mouth sewn shut being placed in someone's house or bed. This is considered a good joke on both the snake and the unsuspecting householder.

An active individual was collected June 27, at 7:15 A.M., when the air temperature was 31.4°, and the ground 33.4°C. One was collected at 6:30 P.M., on October 26, when the air was 25.2°, and the ground 23.0°C.

Leviton (1959) has pointed out that the separation of *C. rhodorachis, C. ventromaculatus,* and *C. karelini,* which broadly overlap geographically and ecologically, is based on nebulous and variable taxonomic characters. The characters of the present series are summarized in table 12.

Table 12. *Measurements (in mm.) and counts for specimens of* Coluber rhodorachis.

CAS number	*Sex*	*Upper labials*	*Lower labials*	*Scale rows*	*Ventrals*	*Caudals*	*Snout-vent length*	*Tail length*
86371	♂	9	10	19	233	139	459	185
86409	♂			19	228	134	733	297
86420	♀	9	10	19	230	51 +	808	145 +
86433	♀	9		19	232	132	665	260
86586	♀	9	10	19	240	137	455	188
86624	juv.	9	10	19	232	131		

Genus **Eirenis** Jan

Eirenis persica (Anderson).

Cyclophis persicus Anderson, 1872, Proc. Zool. Soc. London, p. 392, fig. 8. (Type locality: Bushire, Iran.)

Eirenis persica, Stickel, 1951, Herpetologica, vol. 7, p. 128.

Known range. Northwest India; Pakistan; Turkmen (S.S.R.); Iran; Iraq.

Material examined (3). Station 1, in a house (CAS 86530 [VIII/30/58, ♀]). Road between Station 1 and Station 2 (CAS 86407 [V/25/58, ♀]). Station 4 (CAS 86410 [V/13/58, juv.])

Remarks. The black on the head extends from the nape through the prefrontals. There are no crossbars on the body, which is flesh-pink, the venter dark gray.

Both females contain eggs in the oviducts. CAS 86530 has a single elongate egg, 20 mm. long by 5 mm. wide.

These snakes were collected at night, one on May 13, at about 8:00 P.M., when the air was 34.2°, the surface of the road on which it was collected, 37.6°C., and the surrounding soil 35.2°C.

CAS 86350 has numerous mites under the ventral plates.

Table 13. *Measurements (in mm.) and counts for specimens of* Eirenis persica.

CAS number	*Sex*	*Upper labials*	*Lower labials*	*Scale rows*	*Ventrals*	*Caudals*	*Snout-vent length*	*Tail length*
86407	♀	7	8	15	210	73	288	73
86530	♀	7	8	15	202	72	418	108
86410	juv.	7	7/8	15	197	79	207	58

Genus **Telescopus** Wagler

Telescopus tessellatus tessellatus (Wall).

(Figures 14 and 15.)

Tarbophis tessellatus Wall, 1908, Jour. Bombay Nat. Hist. Soc., vol. 18, pp. 795–805. (Type locality: Maidan Mihaftan, 30 mi. e. of Shustar, southwestern Iran.)

Known range. The typical form of this species has been recognized only from the type locality and vicinity, in the western foothills of the Zagros Mountains, Khuzistan Province, Iran.

Material examined (2). Road between Station 1 and Station 16 (CAS 86376 [V/12/58, ♀). Station 4 (CAS 86460 [VI/24/58, ♂]).

Remarks. These specimens agree with Wall's description, which was based on a single specimen. His type locality is undoubtedly Maidan-i-Naftun, now more often referred to as Masjid-i-Suleiman.

Apparently these two specimens constitute the second recognition of the species. These specimens differ significantly from Schmidt's (1939) description of *Tarbophis martini* from Baghdad, Iraq, only in the greater number of ventral plates and subcaudals. In his specimens, the range for males was 226–232 ventrals, and 67–64 subcaudals; for females, 226–242 ventrals, 65–72 subcaudals. The scale counts for the present specimens are given in table 14. Wall's type had 243 ventrals and 75 subcaudals.

On the basis of Schmidt's description (I have not seen his type series) the difference between *T. tessellatus* Wall and *T. martini* Schmidt would seem to be, at most, subspecific. Schmidt states that *T. martini* is the Iraqi form referred to *iberus* by various authors.

Telescopus tessellatus tessellatus may be characterized as follows (based on Wall's description and my two specimens):

Head broad in temporal region, slightly wider than the length from snout to occiput; rostral scarcely visible from above, broader than high, in contact with six shields, the naso-rostral sutures longest; internasals as long as, or slightly longer than broad; prefrontals one and one-half times as long as internasals; frontal slightly longer than broad; single preocular touching frontal (or barely separated from frontal by prefrontal, as in CAS 86460); loreal enters eye, not twice as long as deep; two or three postoculars; 3d, 4th, and 5th upper labials enter the eye; nostril in semidivided, rectangular nasal; pupil vertical.

Dorsal scales smooth, in 21 rows at mid-body; apical pits singular; ventrals 241–251; subcaudals 75–78; anal entire in the three known specimens (5 of 8 of Schmidt's specimens of *T. martini* have the anal divided).

Light grayish-brown, the body with 39–52 dark brown, subrectangular mid-dorsal crossbars, which alternate with dark brown vertical lateral bars passing down to the angulation of the ventrals; the mid-dorsal crossbars do not always meet accurately on the midline, thus causing oblique or divided crossbars; interspaces one half as wide, to as wide as the crossbars; head brown; venter brownish-black; chin white.

One specimen was seen crawling onto a paved road about 8:00 P.M., on May 12. The air temperature was 34.0°, the road surface 34.6°, and the surrounding soil 32.0°C. A second snake was also found on a paved road, about 9:00 P.M., June 24. The air was 35.0°, the road 38.5°, and surrounding rock surfaces 36.9°C.

The species of *Telescopus* known from Iran may be distinguished as follows:

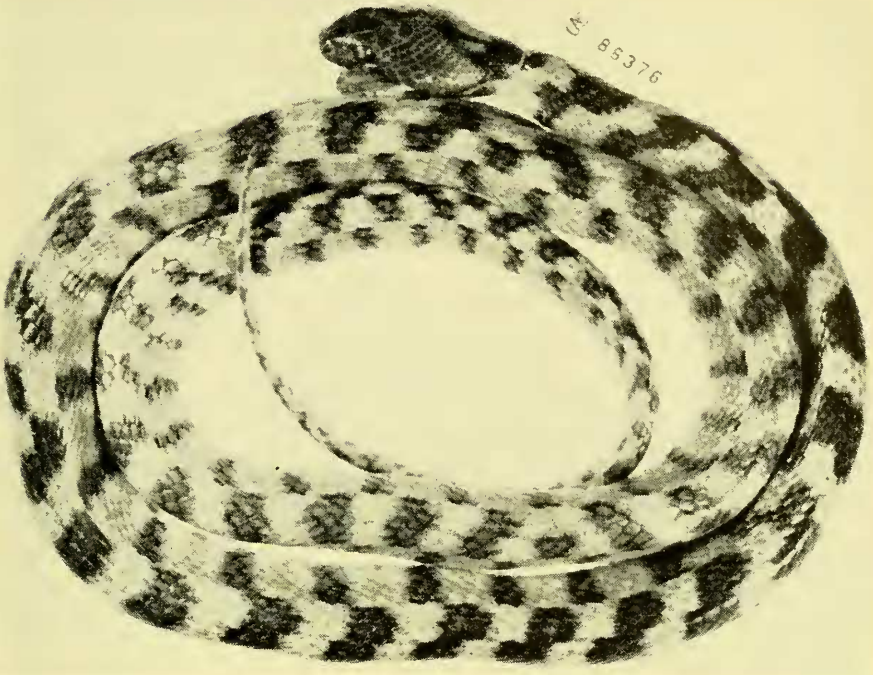
Dorsal scales in 19 rows at mid-body; ventrals 203–235; subcaudals 55–70 ..... *T. fallax iberus*

Dorsal scales in 21 rows; ventrals 241–251; subcaudals 75–78..... ..... *T. tessellatus tessellatus*

Dorsal scales in 23 rows; ventrals 266–280; subcaudals 76–84..... ..... *T. rhinopoma*

Figure 14. *Telescopus tessellatus tessellatus.* Dorsal view.

Figure 15. *Telescopus tessellatus tessellatus.* Ventral view.


S. 85376

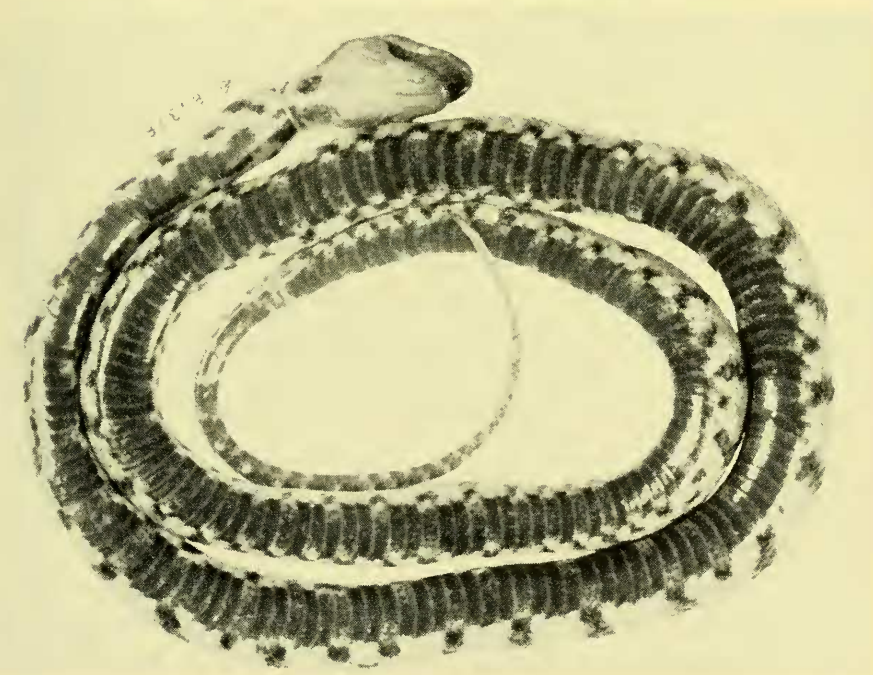


Table 14. *Measurements (in mm.) and counts for specimens of* Telescopus tessellatus tessellatus.

CAS number	Sex	Scale rows	Ventrals	Caudals	Upper labials	Lower labials	Snout-vent length	Tail length
86376	♀	21	241	75	8	11	770	150
86460	♂	21	250½	78	8	10/11	506	95
Type specimen (Wall, 1908)		21	243	75	8			

Genus **Psammophis** Fitzinger

Psammophis schokari (Forskål).

Coluber schokari Forskål, 1775, Descr. Anim., p. 14. (Type locality: Yemen.)
Psammophis schokari, Boulenger, 1896, Cat. Sn. Brit. Mus., vol. 3, p. 157.

Known range. Africa, north of the Sahara, through Arabia and southwestern Asia to Afghanistan, Pakistan, and northwest India.

Material examined (1). Station 1 (CAS 86375 [V/14/58, ♀]).

Remarks. The single specimen has 182 ventrals, 118 subcaudals, and 17 scale rows. Snout-vent length 492 mm., tail 227 mm.

This species was seen in the rocky foothills on several occasions from late February through early March, usually in the morning, basking on rock surfaces. This specimen was collected in a garden, near a house.

Family Elapidae

Genus **Walterinnesia** Lataste

Walterinnesia aegyptia Lataste.

Walterinnesia aegyptia Lataste, 1887, Le Naturaliste, p. 411. (Type locality: Egypt.)

Known range. From Egypt through Israel, Iraq, and Arabia, to the foothills of the Zagros Mountains of Khuzistan Province, Iran.

Material examined (3). Station 1 (CAS 86378 [V/11/58, ♂]; 86501 [IX/1/58, ♀]). Road between Station 1 and Station 2 (CAS 86557 [X/10/58, ♂, DOR]).

Remarks. Masjid-i-Suleiman, or Maidan-i-Naftun, as it appears on some maps, is undoubtedly "Maidan Mihaftan," Wall's (1908) type locality for *Atractaspis wilsoni*. Khuzistan is the modern name for Arabistan, the type

locality for *Naja morgani* Mocquard. Both names have been shown to be synonyms for *Walterinnesia aegyptia* Lataste (Marx, 1953).

My three specimens were collected in and around gardens in the housing areas of the Iranian Oil Exploration and Producing Company.

A juvenile specimen in the hospital at Masjid-i-Suleiman has very narrow light crossbands.

CAS 86501 contains ovarian eggs. There are a few ants, but nothing else, in the intestine.

Family Viperidae

Genus **Echis Merrem**

Echis carinatus (Schneider).

Pseudoboa carinata Schneider, 1801, Hist. Amphib., vol. 2, p. 285. (Type locality: Arni. Based on a figure by Russell, 1796, Ind. Serp., vol. 1, pl. 2.)

Echis carinata, Wagler, 1830, Syst. Amph., p. 177.

Known range. Africa, north of the equator through southwestern Asia and Arabia to Turkmen (S.S.R.), Afghanistan, the whole of India south of the Ganges, except Bengal, and into the dry areas of Ceylon (Parker, 1932, and Smith, 1943).

Material examined (1). Station 32 (CAS 86632 [X/23/58, ♂]).

Remarks. This snake was seen crawling across a dune area at 9:00 A.M., October 23. The anal temperature was 37.5°, the air 33.5°, and the surface of the sand 38.5°C. It was not moving in the sidewinding fashion later observed in captivity. Tracks made by sidewinding were seen in all dune areas visited in Iran. When alarmed, this species has a characteristic locomotion which enables it to retreat, while keeping the head always toward its adversary. The body is positioned in a series of loops, the loops pressed together, so that as the snake moves, the lateral surfaces of the body are rubbed together. The obliquely arranged lateral scales, which have serrated keels, are thus rubbed together, producing a loud, continuous, hissing sound. The body moves cephalad, but the snake is able to retreat, the net movement being away from the source of danger. From this position the snake is able to strike about $\frac{2}{3}$ the length of its body, the violence of the strike often carrying the entire animal forward.

This snake is extremely aggressive, striking violently on the least provocation.

The records of the Anglo-Iranian Oil Company describe a case of a laborer fatally bitten by a snake which was probably *E. carinatus*. The man reached his hand under a pipe to investigate a hissing sound he took to be a leak in the line, and was bitten. The symptoms demonstrated by this victim,

haematuria, and haematemesis, seem to indicate that the capillary endothelium was attacked by the venom.

Genus **Pseudocerastes** Boulenger[8]

Pseudocerastes persicus (Duméril and Bibron).

Cerastes persicus Duméril and Bibron, 1854, Erp. Gen., vol. 7, p. 1443, pl. 78b.
Pseudocerastes persicus, Boulenger, 1896, Cat. Sn. Brit. Mus., vol. 3, p. 501.

Known range. Iran; Afghanistan; Pakistan.

Material examined (1). Station 27 (CAS 86633 [X/27/58, collected by W. O. Williams]).

Remarks. This specimen has 156 ventrals, 42 subcaudals, and 23 scale rows at mid-body.

The snake was collected near an oil drilling rig, about 7:00 P.M.

Three types of locomotion were demonstrated by this snake in captivity: the most usual movement was lateral undulations of the body in "typical" snake fashion, only the head and neck raised from the surface of the ground; on one occasion it was seen to move forward in a straight line by moving the ventral plates; when sufficiently provoked, it would move with a sidewinding movement, the entire body touching the surface when sluggish and moving slowly, the body raised into the usual loops, and making the characteristic track when moving rapidly.

This individual was far less aggressive than the specimen of *Echis carinatus*, and could be prodded and moved about, seldon attempting to strike.

CHECK LIST OF AMPHIBIANS AND REPTILES REPORTED FROM IRAN

It is difficult to evaluate all of the records in the literature for the various species reported from within the political boundaries of Iran. Many taxonomic problems still exist, and these have been resolved in many different ways by previous authors. Unless one author were to have access to all of the specimens which have been collected in Iran, it would be impossible to decide with any assurance on the presence or absence of many forms. The present list includes several forms which have not been collected since their original discovery, and some of these may subsequently prove synonymous with other forms. In addition, many early locality records were far from precise, and many province names used by early collectors no longer have

8. Dr. Jean Guibé (personal communication) has recently compared the type of his *Pseudocerastes latirostris* with the description of *Eristocophis mcmahoni* Alcock and Finn (which was previously unavailable to him) and feels that they are synonymous. Neither Dr. Guibé, nor I, have seen the types of *E. mcmahoni* (which are in London and Calcutta), but on the basis of the description are agreed that separation of this form from the genus *Pseudocerastes* is probably not warranted.

the same connotation they once had. In a few cases I have included border records, particularly in southeastern Iran, in the region previously widely designated as Baluchistan. In any case, there is geographical, and probably ecological continuity between far southeastern Iran and that area of West Pakistan previously known as Baluchistan. I have not recognized many of the varietal and subspecific names used by previous authors.

Class **AMPHIBIA**

Order CAUDATA

Family Salamandridae

Neurergus crocatus crocatus Cope
Neurergus crocatus kaiseri Schmidt
Triturus cristatus karelini (Strauch)
Triturus cristatus longipes (Strauch)

Order SALIENTIA[9]

Family Bufonidae

Bufo luristanicus Schmidt
Bufo oblongus Nikolsky
Bufo olivaceus Blanford
Bufo persicus Nikolsky
Bufo surdus Boulenger
Bufo viridis arabicus Heyden
Bufo viridis viridis Laurenti

Family Hylidae

Hyla arborea savignyi Audouin

Family Ranidae

Rana cyanophlyctis Schneider
Rana ridibunda ridibunda Pallas

Class **REPTILIA**

Order CHELONIA

Family Emydidae

Clemmys caspica caspica (Gmelin)
Emys orbicularis (Linnaeus)

9. *Pelobates fuscus* was reported from Iran by Boulenger (1899) on the basis of a series of tadpoles from the region of Lake Urmia. This is the only record for this species from Iran; confirmation is required.

Family Testudinidae

Testudo graeca ibera Pallas
Testudo horsfieldi Gray
Testudo zarudnyi Nikolsky

Family Trionychidae

Trionyx euphraticus (Daudin)

Order SQUAMATA

Suborder SAURIA

Family Gekkonidae

Agamura persica (Duméril)
Alsophylax crassicauda Nikolsky
Alsophylax pipiens (Pallas)
Bunopus persicus (Nikolsky)
Bunopus tuberculatus Blanford
Ceramodactylus affinis Murray
Ceramodactylus doriae Blanford
Crossobamon eversmanni (Wiegman)
Cyrtodactylus agamuroides (Nikolsky)
Cyrtodactylus brevipes (Blanford)
Cyrtodactylus caspius (Eichwald)
Cyrtodactylus fedtschenkoi (Strauch)
Cyrtodactylus heterocercus (Blanford)
Cyrtodactylus kirmanensis (Nikolsky)
Cyrtodactylus kotschyi (Steindachner)
Cyrtodactylus longipes (Nikolsky)
Cyrtodactylus russowi (Strauch)
Cyrtodactylus scaber (Heyden)
Cyrtodactylus zarudnyi (Nikolsky)
Eublepharis macularius (Blyth)
Hemidactylus flaviviridis Rüppel
Hemidactylus persicus Anderson
Hemidactylus turcicus (Linnaeus)
Microgecko helenae Nikolsky
Phyllodactylus elisae Werner
Pristurus rupestris Blanford
Ptyodactylus hasselquisti (Donndorf)
Stenodactylus lumsdeni Boulenger
Teratoscincus bedriagai Nikolsky
Teratoscincus microlepis Nikolsky
Teratoscincus scincus (Schlegel)

Family AGAMIDAE

Agama agilis Olivier
Agama caucasica (Eichwald)
Agama erythrogaster Nikolsky
Agama kirmanensis Nikolsky
Agama megalonyx (Günther)
Agama melanura (Blyth)
Agama microlepis (Blanford)
Agama microtympanum Werner
Agama nupta De Filippi
Agama persica Blanford
Agama rubrigularis (Blanford)
Agama ruderata Olivier
Calotes versicolor (Daudin)
Phrynocephalus helioscopus (Pallas)
? Phrynocephalus interscapularis Lichtenstein
Phrynocephalus luteoguttatus Boulenger
Phrynocephalus maculatus Anderson
Phrynocephalus mystaceus Pallas
Phrynocephalus ornatus Boulenger
Phrynocephalus persicus De Filippi
Phrynocephalus scutellatus (Olivier)
Uromastix asmussi (Strauch)
Uromastix loricatus (Blanford)
Uromastix microlepis Blanford

Family VARANIDAE

Varanus griseus Daudin
Varanus monitor (Linnaeus)

Family AMPHISBAENIDAE

Diplometopon zarudnyi Nikolsky

Family ANGUIDAE

Anguis fragilis colchicus Demidoff
Ophisaurus apodus (Pallas)

Family LACERTIDAE

Acanthodactylus cantoris blanfordi Boulenger
Acanthodactylus cantoris schmidti Haas
Acanthodactylus micropholis Blanford
Apathya cappadocica urmiana Lantz and Suchow

Family Lacertidae—Cont.

Eremias arguta (Pallas)
Eremias fasciata Blanford
Eremias guttulata guttulata (Lichtenstein)
Eremias guttulata watsonana Stoliczka
Eremias intermedia nigrocellata Nikolsky
Eremias lineolata (Nikolsky)
Eremias scripta (Strauch)
Eremias velox persica Blanford
Eremias velox strauchi Kessler
Lacerta brandti De Filippi
Lacerta chlorogaster Boulenger
Lacerta media Lantz and Cyrén
Lacerta muralis Merrem
Lacerta princeps Blanford
Lacerta saxicola defillipi (Camerano)
Lacerta strigata Eichwald
Lacerta viridis Linnaeus
Ophisops blanfordi Schmidt
Ophisops elegans ehrenbergi (Wiegman)
Ophisops elegans elegans Ménétries

Family Scincidae

Ablepharus bivittatus Ménétries
Ablepharus grayanus Stoliczka
Ablepharus pannonicus Lichtenstein
Ablepharus persicus Nikolsky
Chalcides ocellatus ocellatus (Forskål)
Eumeces schneideri variegatus Schmidt
Eumeces taeniolatus Blyth
Eumeces zarudnyi Nikolsky
Mabuya aurata septemtaeniata (Reuss)
Ophiomorus blanfordi Boulenger
Ophiomorus brevipes (Blanford)
Ophiomorus miliaris (Pallas)
Ophiomorus persicus (Steindachner)
Ophiomorus tridactylus (Blyth)
Scincus conirostris Blanford

Suborder SERPENTES

Family Typhlopidae

Typhlops braminus (Daudin)

Family TYPHLOPIDAE—Cont.

Typhlops vermicularis Merrem
Typhlops wilsoni Wall

Family LEPTOTYPHLOPIDAE

Leptotyphlops hamulirostris (Nikolsky)
Leptotyphlops laticeps (Nikolsky)
Leptotyphlops macrorhynchus (Jan)

Family BOIDAE

Eryx elegans (Gray)
Eryx jaculus (Linnaeus)
Eryx johni (Russell)
Eryx miliaris (Pallas)
Eryx tataricus (Lichtenstein)

Family COLUBRIDAE

Boiga trigonata melanocephala (Annandale)
Coluber andreana Werner
Coluber caudaelineata (Günther)
Coluber dahlii (Fitzinger)
Coluber gemonensis (Laurenti)
Coluber jugularis asianus (Boettger)
Coluber karelini Brandt
Coluber ravergieri Ménétries
Coluber rhodorachis (Jan)
Coluber tyria Linnaeus
Coluber ventromaculatus Gray
Coronella austriaca Laurenti
Eirenis collaris (Ménétries)
Eirenis coronella (Schlegel)
Eirenis coronelloides (Jan)
Eirenis decemlineata (Duméril and Bibron)
Eirenis frenatus (Günther)
Eirenis iranica Schmidt
Eirenis meda (Cernov)
Eirenis modesta (Martin)
Eirenis persica (Anderson)
Eirenis punctatolineata (Boettger)
Eirenis rothi Jan
Elaphe dione (Pallas)
Elaphe hohenackeri (Strauch)

Family Colubridae—Cont.

Elaphe longissimus Laurenti
Elaphe quatuorlineata (Lacépède)
Lycodon striatus bicolor (Nikolsky)
Lytorhynchus diadema (Duméril and Bibron)
Lytorhynchus gaddi Nikolsky
Lytorhynchus ridgewayi Boulenger
Malpolon moilensis (Reuss)
Malpolon monspessulana (Hermann)
Natrix natrix persa (Pallas)
Natrix tessellata (Laurenti)
Psammophis lineolatus (Brandt)
Psammophis schokari (Forskål)
Ptyas mucosus (Linnaeus)
Rhynchocalamus satunini (Nikolsky)
Spalerosophis diadema diadema (Schlegel)
Spalerosophis microlepis (Jan)
Spalerosophis schirazianus (Jan)
Telescopus fallax iberus (Eichwald)
Telescopus rhinopoma (Blanford)
Telescopus tessellatus (Wall)

Family Elapidae

Naja naja oxiana (Eichwald)
Walterinnesia aegyptia Lataste

Family Viperidae

Agkistrodon halys (Pallas)
Echis carinatus (Schneider)
Pseudocerastes mcmahoni (Alcock and Finn)[10]
Pseudocerastes persicus (Duméril and Bibron)
Vipera lebetina (Linnaeus)
Vipera raddei Boettger
Vipera renardi (Christopher)

ZOOGEOGRAPHY

A detailed geographic analysis of the herpetofauna of Iran must await the availability of more material. Nevertheless, some general statements concerning distribution patterns can be made on the basis of available information.

Iran lies entirely within the Palearctic region. Geographically and eco-

10. See footnote, p. 472.

logically, it may be divided into more or less well-defined provinces. Of these geographical provinces, only the central plateau of Iran lies entirely within the political boundaries of the country. The folds of the Zagros Mountains, which border the plateau on the west and south, extend from the Anatolian highlands of eastern Turkey into southeastern Iran. The northern highlands, including the Elburz Mountains and folds of the Kopet Dagh, separate the central plateau from Russian Turkmen. These northern folds extend from the Zagros and Caucasus to the Hindu Kush of Afghanistan. The varied and broken terrain east of the plateau extends into western Afghanistan.

In the extreme north, the area bordering the Caspian Sea and the southern slopes of the Elburz Mountains has a moist climate, and is geographically and ecologically distinct from the rest of Iran.

Southwestern Iran includes the Ahwaz Plain, geographically an extension of the Mesopotamian lowlands. The western foothills of the Zagros Mountains, extending from southern Turkey and northeastern Iraq to the coastal areas of the Persian Gulf, form a border zone separating the Mesopotamian lowlands from the Zagros highlands.

The narrow coastal plain of the Persian Gulf connects the lowlands of southwestern Iran with the broken terrain of southeastern Iran and Baluchistan. The terrain of southeastern Iran is continuous into western Pakistan.

Certain wide-ranging Palearctic species are present in Iran. These species are characterized by their broad ecologic tolerances, and consequently are widely spread over most of the geographic provinces of Iran. These include *Bufo viridis, Hyla arborea, Rana ridibunda, Natrix tessellata,* and *Coluber gemonensis.* These species are absent from southeastern Iran.

Many elements of the Iranian herpetofauna have essentially a Mediterranean distribution. These fall into two categories: (1) species present in southern Europe, most of which are limited in their European distribution to the countries bordering the Mediterranean, and (2) North African species. Generally speaking, these elements are most prominent in western Iran, the number of species with Mediterranean affinities decreasing sharply east of the Zagros Mountains. Existing material is insufficient for a more precise numerical analysis of species in the various geographic provinces.

Species of the first category are distributed through Turkey, and include: *Testudo graeca, Cyrtodactylus kotschyi, Ophisaurus apodus, Coluber dahlii, Eirenis collaris,* and *Malpolon monspessulana.*

Typical of species distributed in North Africa, through the eastern borders of the Mediterranean, Syria, Arabia, Iraq, and Iran are: *Ptyodactylus hasselquisti, Mabuya aurata, Eumeces schneideri, Chalcides ocellatus, Leptotyphlops macrorhynchus, Lytorhynchus diadema,* and *Malpolon moilensis.*

Certain species present in southeastern Iran are more extensively dis-

tributed in southeastern Asia. Few of these species are present west or north of Iranian Baluchistan. Species more representative of the Oriental region than of southwest Asia are: *Rana cyanophlyctis, Calotes versicolor, Varanus monitor, Typhlops braminus, Eryx johni, Boiga trigonata,* and *Naja naja oxiana.*

A very few species, for the most part confined to the northeastern part of Iran, are representatives of the Central Asian fauna. *Eryx miliaris, Psammophis lineolatus, Vipera renardi,* and *Agkistrodon halys* fall into this category.

Most of the species inhabiting the area on the southern edge of the Caspian Sea are representatives of a Euro-Siberian fauna, and do not extend far into the more arid southern areas of Iran. *Triturus cristatus, Emys orbicularis, Lacerta strigata, Lacerta saxicola, Anguis fragilis, Natrix natrix, Elaphe longissimus,* and *Coronella austriaca* are examples of this fauna.

More prominent in the southern regions of Iran than in the northern areas are those species widely and continuously distributed from the arid regions of western India through southwest Asia to the deserts of the African continent. This element is represented by *Cyrtodactylus scaber, Hemidactylus flaviviridis, Agama ruderata, Varanus griseus, Eremias guttulata, Ablepharis pannonicus, Coluber rhodorachis, Spalerosophis diadema, Psammophis schokari, Vipera lebetina,* and *Echis carinatus.*

By far the most numerous elements in Iran are those species whose distribution is entirely confined to southwestern Asia. This area extends from the Red Sea and the Mediterranean on the west, through Afghanistan and western Pakistan on the east. On the north it is bounded by the Caucasus Mountains and the Trans-Caspian region. Certain species typical of this geographic region have their ranges variously extended into contiguous areas, *i.e.,* Egypt, Cyprus, Turkmen, or northwestern India. It is possible to further divide the southwest Asian species according to the centers of their ranges. The ranges of some center in the northeastern part of the region, *i.e.,* Afghanistan and northeastern Iran, some in Baluchistan, some in the southwest, Arabia and Iraq, and some in the highlands of the northwestern areas. Finally, some species are broadly distributed throughout most of southwest Asia. All of these categories overlap, and the significance of such distribution cannot be evaluated until more material is available.

Species widely distributed in southwest Asia include: *Clemmys caspica* (absent from the eastern portions of the region), *Eublepharis macularius, Hemidactylus persicus, Bunopus tuberculatus, Pristurus rupestris, Agama nupta, Agama agilis, Phrynocephalus maculatus, Acanthodactylus cantoris, Eremias brevirostris, Ophisops elegans, Typhlops vermicularis, Coluber ravergieri, Coluber ventromaculatus, Eirenis persica, Eirenis frenatus,* and *Pseudocerastes persicus.*

Species more or less restricted to the southwest, *i.e.,* Arabia, Israel, Jor-

dan, Syria, Iraq, and southwestern Iran are *Trionyx euphraticus, Phyllodactylus elisae, Ceramodactylus doriae, Microgecko helenae, Agama persica, Uromastix loricatus, Uromastix microlepis, Diplometopon zarudnyi, Ophisops blanfordi, Scincus conirostris, Eryx jaculus, Eirenis coronella, Eirenis decemlineata, Eirenis rothi, Telescopus tessellatus,* and *Walterinnesia aegyptia.*

Representative of species having a southeastern distribution, *i.e.,* Pakistan, southern Afghanistan, and eastern Iran, are: *Bufo olivaceus, Agama melanura, Agama megalonyx, Agama rubrigularis, Phrynocephalus scutellatus, Phrynocephalus ornatus, Phrynocephalus luteoguttatus, Uromastix asmussi, Acanthodactylus micropholis, Ablepharus grayanus, Ophiomorus brevipes, Ophiomorus blanfordi, Ophiomorus tridactylus,* and *Telescopus rhinopoma.*

Northeastern species, those characteristic of northeastern Iran, Turkmen, and Afghanistan, are represented by *Testudo horsfieldi, Cyrtodactylus fedtschenkoi, Cyrtodactylus caspius, Teratoscincus scincus, Eremias lineolata,* and *Coluber karelini.*

Some southwest Asian species are distributed primarily in the northwestern highlands of the Zagros Mountains in Iran, northern Iraq, and Turkey. Some of these elements extend south in Iran along the Zagros Mountains. In this northwestern category are: *Neurergus crocatus, Testudo graeca ibera, Apathya cappadocica urmiana, Lacerta brandti, Eirenis collaris, Rhynchocalamus satunini,* and *Telescopus fallax iberus.*

Many endemic species have been recorded for Iran. The majority of these, however, are known from single specimens or from single localities. Until more material is forthcoming, or at least until the types of these species can be compared with more widely distributed related species, most must be regarded as having doubtful status. Little can be said of the significance of endemic forms in Iran until their affinities have been more extensively analyzed. Of particular interest in this regard are *Bufo olivaceus, B. persicus,* and *B. surdus,* known only from within narrow limits in eastern Iran and ecologically continuous areas to the east. Whether they are most closely allied to species to the east, or to *Bufo viridis* to the north and west, remains to be demonstrated. *Bufo luristanicus,* known only from the type, in the higher foothills of the Zagros Mountains in southwestern Iran, is said by Schmidt (1955) to be allied to *B. viridis,* with which it is sympatric. An unusually large number of species of *Cyrtodactylus* (as revived and redefined by Underwood, 1954) reportedly occur in Iran. Many of these are little-known endemics, which analysis may prove conspecific with more widely ranging forms.

It is noteworthy that the greatest number of endemics are reported from the central plateau region. A large proportion of the herpetofauna of that area, which includes eastern Kerman, Khorasan, Samnan Damghan, and eastern Tehran Provinces, is restricted to that region and adjacent areas of

similar elevation in Afghanistan. Some of the species known only from this region are: *Bufo persicus, Testudo zarudnyi, Cyrtodactylus zarudnyi, Cyrtodactylus longipes, Agamura persica, Teratoscincus bedriagai, Teratoscincus microlepis, Agama kirmanensis, Agama erythrogaster, Eumeces zarudnyi,* and *Lycodon striatus bicolor.*

Apparently there is some degree of endemism in the south and central Zagros Mountains, but until the fauna of this region is more extensively collected, little can be said regarding the status of endemics.

Bufo luristanicus, Cyrtodactylus heterocercus, and *Telescopus tessellatus* have thus far been reported only from the western foothills of the Zagros Mountains.

Considering the herpetofauna of southwest Asia on the generic level, a few broad observations can be made. There are few amphibians in southwestern Asia. Those present belong to genera distributed widely in the Palearctic and are either widespread species with broad tolerances, or are little-known endemics of uncertain affinities.

Among the reptiles, certain genera are distributed principally in the arid regions north of the tropics, from North Africa to northwestern India, and occasionally extending into the steppes and high deserts of the USSR, northwestern China, and Mongolia. These genera have few or no representatives in tropical or moist-temperate regions. *Alsophylax, Bunopus, Teratoscincus, Phrynocephalus, Uromastix, Acanthodactylus, Scincus, Eryx, Eirenis, Lytorhynchus, Pseudocerastes,* and *Echis* illustrate this pattern. The monotypic genus *Diplometopon,* and the elapid genus *Walterinnesia,* known from Egypt to southwestern Iran, are two of the most narrowly restricted southwest Asian genera.

A number of genera are distributed continuously from the tropical areas of Africa through arid southwestern Asia and tropical southeastern Asia. A large proportion of these genera are most diverse in the tropics, with few species in the connecting arid region. This category is represented by *Testudo, Hemidactylus, Mabuya, Varanus,* and *Typhlops.*

Other genera, present both in tropical Africa and tropical Asia, are conspicuously absent from the Middle East. *Leiolopisma, Riopa, Python, Boiga,* and *Naja* are genera having this distribution pattern. *Boiga trigonata* and *Naja naja oxiana* extend slightly into the eastern part of southwest Asia, but there are no representatives of these genera west of Iran in Asia.

There are very few genera having representative species in southwest Asia, which are primarily tropical in numbers of species, but whose tropical distribution is limited only to Asia or exclusively to Africa. The genus *Agama* is found throughout tropical Africa, but is absent in the tropics of Asia. It has many species in southwest Asia, however. The tropical Asian genus *Calotes* has but one species (the widely distributed *C. versicolor*) entering the Middle East in the southeastern area.

Finally, some widespread Holarctic and Palearctic genera have representative species in southwest Asia. Few of these species are restricted to southwest Asia. Among the turtles, *Clemmys* and *Trionyx* each have a single species in the Middle East (both of these species restricted to this region). *Lacerta, Eumeces, Ophisaurus, Anguis, Natrix* (a genus also widespread in the Asian tropics), and *Agkistrodon* are each represented by one or a few species in southwest Asia. The genus *Vipera,* distributed widely in the tropics as well as in the Palearctic, has a few Middle Eastern species. *Coluber,* also found in both tropic and temperate regions of the world, contains many species in southwest Asia, most of them limited to this region.

There seem to be no species, and only one genus (*Trionyx*), showing a pattern of discontinuous distribution through the Middle East and tropical or temperate areas. There is, for instance, no evidence that any species is found in tropical Africa, eastern or tropical Asia, and in an isolated area or areas in southwest Asia. The genus *Trionyx* (represented in the Middle East by *T. euphraticus,* known only from the Euphrates River and its tributaries) is cosmopolitan.

There are, however, genera (but no species) found both in Africa and southeastern Asia, but absent in the connecting Middle East.

It appears that the arid region extending through southwestern Asia has been a distinct geographic unit long enough to have developed a characteristic herpetofauna at the species level, and to a lesser extent at the generic level, as the majority of species known from the Middle East are restricted to that area, while most of the genera are widely distributed.

Within the political boundaries of Iran there are diverse habitat situations, and each of the several geographically distinct regions has its characteristic fauna. The exact composition of these faunas cannot be elaborated within our present knowledge.

The uncontrolled cutting of woodland throughout the Middle East, a practice continuing practically unabated, has undoubtedly had a profound effect on the present distribution of the fauna. Recorded history indicates that forest and scrub were far more extensive in the recent past. The fact that remaining woodland seems to be living a marginal existence appears to indicate a change toward an increasingly arid climate. Closer examination of woodland faunas may reveal discontinuous distributions of herpetofaunal elements in southwestern Asia.

SUMMARY

One hundred seventy-seven species of amphibians and reptiles in sixty-five genera have been recorded from within the political boundaries of Iran. The actual number of species may prove to be somewhat less when problems of synonymy have been more extensively investigated. Thirty-three species, or 19 per cent of the known herpetofauna, are represented in the present

collection. The majority of these (21 species) were collected in the western foothills of the Zagros Mountains in southwestern Iran.

Relatively few collections have been made in Iran, and many species have been recorded from single localities. Many taxonomic problems must await the collection of further specimens and examination of typical material. Distribution is incompletely known for all species. Many of the early locality records are not precise, and require confirmation.

The aridity and prolonged hot season impose severe limitations on the fauna of the foothill region of southwestern Iran. The length of the growing season varies with the duration of the winter and spring rainy season. The vegetation is almost entirely herbaceous in this area, and is extensively grazed by sheep and goats. By late spring the hills are completely denuded. The large numbers of insects, which coincide with the blooming of herbaceous plants in the spring, dwindle through the summer. Grasshoppers and ants form the bulk of the food supply for many species throughout the summer.

Various behavioral adaptations enable the amphibians and reptiles to survive the long summer. Foraging activity begins in the early morning hours, diurnal lizards quickly reaching temperatures of normal activity by exposing a maximum surface area to the direct rays of the sun. As ambient temperatures rise, the period of activity is extended by utilization of small areas of shade (particularly the case with lacertids), brief dashes being made into direct sunlight. The agamid lizards may remain in the sun, but position themselves so that the sun's rays strike a minimum surface area, and at a small angle. *Agama agilis* ascends low bushes during extremely hot periods, and thus may escape much of the reradiated heat from the hot ground surface. The agamid lizards may benefit from changes in their albedo. They are dark in color when basking, and much lighter during the heat of the day. These color changes may supplement behavioral temperature regulation.

The reptiles retreat to shelter during the hottest hours. Deep crevices in limestone outcrops provide shelter for *Agama nupta, Mabuya aurata septemtaeniata,* and several of the snakes. *Agama agilis* and *Eremias guttulata watsonana* seek refuge under small rocks or in rock piles on level ground. The latter species also utilizes small holes and cracks in the hard-packed soil.

A few small streams persist throughout the summer, often only as intermittent pools. In many dry stream beds, moisture may be found a few inches beneath the surface. A moist, cool, microclimate is also maintained in small caves and sinkholes in the gypsum formations. These areas provide a summer refuge for the amphibians, and shelter nocturnal reptiles during the day. These cracks and crevices are also utilized by *Agama nupta* during the hottest hours, and presumably at night.

Several species of geckos and snakes are able to exist in the area due to

their nocturnal habits, and the fact that temperatures do not drop below their normal activity range at night during the summer.

Dune-dwelling species are able to escape the severe midday temperatures by retreating to burrows a few inches below the sand surface.

Anal temperatures indicate that the normal activity range for most of the diurnal lizards of southwestern Iran is between 38.0° and 42.0°C. *Uromastix loricatus* was actively foraging at times when its anal temperature exceeded 43°C. *Agama agilis* was consistently found in direct sunlight, the anal temperature above 40°C. Critical maximum temperatures for most diurnal lizards are between 46° and 49°C. Both *Uromastix loricatus* and *Scincus conirostris* recovered from temperatures above 50°C. Cowles and Bogert (1944) found that the normal activity range of diurnal lizards of the deserts of the southwestern U.S. was approximately 35°–43°C., and that the lizards preferred temperatures of about 37°C. They found that lizards avoided temperatures above 40°C. Critical maximum temperatures were reported to be 43°–49°C.

As air and surface temperatures increased during the late spring and summer in southwestern Iran, a shift in the periods of reptilian activity was noted. During the moderate spring temperatures, activity was confined to the midday hours. By midsummer, foraging activity was noted only during the earliest daylight hours, and again in late afternoon.

A detailed zoogeographic analysis of the Iranian herpetofauna must await more extensive locality data, and the analysis of many systematic problems. Nevertheless, it is apparent that the several geographic and ecologic provinces of Iran are characterized by distinct differences in the composition of their faunas. Southwestern Iran and the northwestern highlands have a greater number of species with Mediterranean affinities than do the regions east of the Zagros Mountains. Southeastern Iran shares species with Pakistan and India, while elements of the Central Asia fauna are present in the northeast of the country. Apparently there is a relatively high degree of endemism on the central plateau of Iran. A European fauna prevails north of the Elburz Mountains on the south coast of the Caspian Sea. The majority of amphibians and reptiles known from Iran are restricted in their distribution to the Middle East.

Southwest Asia has apparently existed as a geographic unit long enough to have developed a characteristic herpetofauna, particularly at the species level.

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